AVIATION WEEK

SEPT. 6, 1954

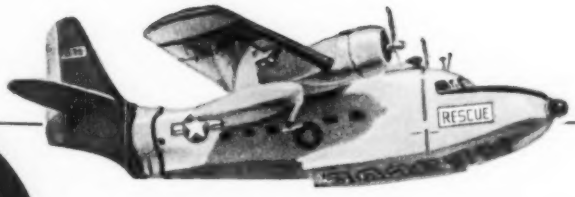
50 CENTS

A McGRAW-HILL PUBLICATION

J2F

GRAY GOOSE

ALBATROSS



Grumman

WING SPREAD—THE WORLD

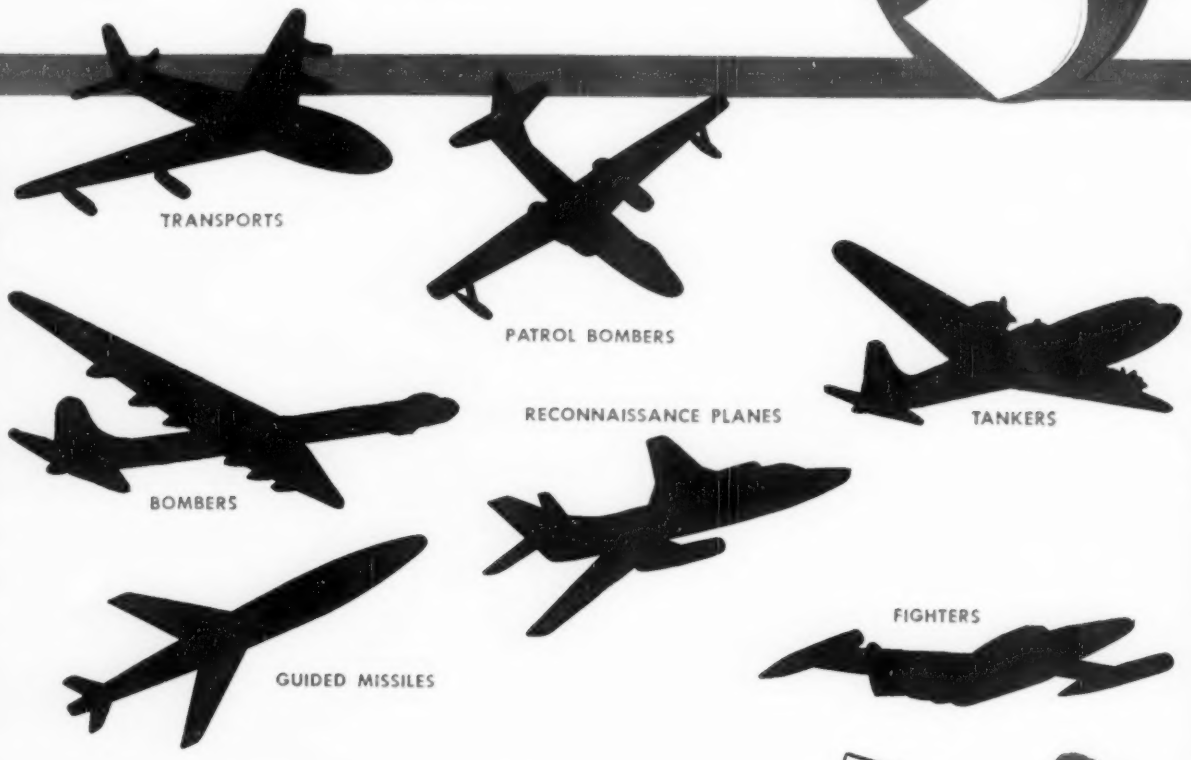
Starting with the J2F and the Gray Goose, built in the thirties, Grumman amphibians have helped open remote parts of the globe. The present production amphibian, the Albatross, is in global operations with the USAF Air Rescue Services, the Navy, and the Coast Guard. All told, Grumman has built more amphibians than any company in the world.

GRUMMAN AIRCRAFT ENGINEERING CORPORATION BETHPAGE • LONG ISLAND • NEW YORK

DESIGNERS AND BUILDERS ALSO OF THE COUGAR JET FIGHTER, S2F-1 SUB-KILLER, METAL BOATS, AND AEROBILT TRUCK BODIES

Sundstrand Constant Speed Drives are now on all these types of aircraft . . .

SUNDSTRAND



Sundstrand Constant Speed Drives are used on all these types of aircraft because of the increasing need for constant frequency a-c power —power that is efficient, versatile, capable under all conditions. The Sundstrand Drive makes possible a completely automatic, parallel, constant frequency a-c system which is . . .

Efficient—because it is a low-weight system, with more flexible distribution of power, with small wires to most individual loads. This system uses fewer types of electrical power, a minimum of engine pads, and has fewer pieces of rotating equipment having brushes, commutators, slip rings, and voltage regulators. The low-weight, highly efficient Sundstrand Drive and the high efficiency of extracting shaft power from the engine add to the over-all system efficiency.

Versatile—one type of power can be used for instrumentation, radio and electronics, motor loads, and lighting, heating, and deicing loads. Simple transformer-rectifiers provide even wider design latitudes.

Capable—full rated electrical system power, plus overload capacity, is available from engine idle to full thrust. Greater, faster fault-clearing capacity, with less structural damage where faults occur, is inherent in the system, as is great growth capacity.

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WANTED!

. . . mechanical and hydraulic engineers!

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Division of Sundstrand Machine Tool Company, ROCKFORD, ILLINOIS • Western District Office: Hawthorne, California

CONSTANT SPEED DRIVES • AIRCRAFT ACCESSORIES

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER

Light shoe gives fighter more kick

REPUBLIC'S RF-84-F Thunderstreak is equipped with B. F. Goodrich brakes . . . brakes made lighter to help save weight for the supersonic fighter's guns and cameras.

A new kind of brake shoe assembly uses a light magnesium shoe with a bonded lining. This eliminates rivets, permits use of a lighter weight lining that can be worn down a greater percentage of its full thickness. The shoe is operated by a narrow cavity expander tube that gives high braking pressure with less fluid, and, of course, *less* weight. And because the pressure is applied outward to the brake lining without need for complicated parts, still more weight is saved.

Because the braking action applies equal pressure around a full circle, the load is distributed more evenly over the drum. Result: slower lining wear, less maintenance. And landings are safer and smoother with B. F. Goodrich brakes. They respond evenly to minimum pressure, yet are built to handle emergency overloads. They will not lock or grab. Strong retractor springs eliminate brake drag. Relining can be handled with a screw driver and pliers.

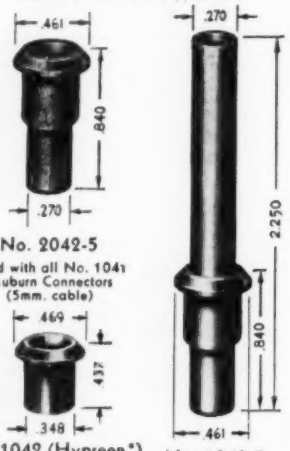
This B. F. Goodrich principle of full circle braking is used for all sizes of B. F. Goodrich brakes—from light private planes to huge bombers. It's one of many aviation developments that have come from B. F. Goodrich, leader in rubber research and engineering.

Other B. F. Goodrich products for aviation: tires and wheels, De-Icers, heated rubber, inflatable seals, Pressure Sealing Zippers, Avtrim, fuel and oil cells, Rivnuts, hose and other accessories. For more information write *The B. F. Goodrich Company, Aeronautical Sales, Akron, Ohio.*

B.F.Goodrich
FIRST IN RUBBER

Auburn
IGNITION ACCESSORIES

Terminal Collars (Seals)
Ozone Resistant Hypreen*



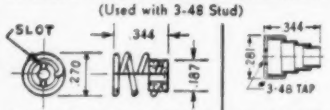
No. 2042-5
Used with all No. 1041 Auburn Connectors (5mm. cable)

No. 1042 (Hypreen*)
No. 1043 (Silicone)
Used with all No. 1041 Auburn Connectors (7mm. cable)

No. 1042-5
Used with all No. 1041 Auburn Connectors (5mm. cable)

*Auburn Synthetic Rubber

SPRING AND EYELET ASSEMBLIES
(Used with 3-48 Stud)



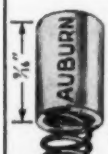
No. 1066-9A (AN 4164-22) with stainless steel coil springs

No. 1066-9V with Inconel volute springs

Teflon Connectors
with Inconel volute springs

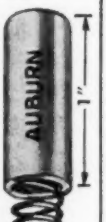
1041-TV (9/16")
1099-TV (1")

Connectors with stainless steel coil springs



1041-C Steatite
1041-M Mycalex
1041-D Alumina
(AN 4164-2)

1041



1099-C Steatite
1099-M Mycalex
1099-F Phenolic
1099-D Alumina
(AN 4164-1)

1099

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Co. Inc., Auburn, N.Y.

Aviation Week

SEPTEMBER 6, 1954 VOL. 61, No. 10

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Washington 4, D. C.—National Press Bldg., Phone NAtional 8-3414
Los Angeles 17—1111 Wilshire Blvd., Phone MAdison 6-4323

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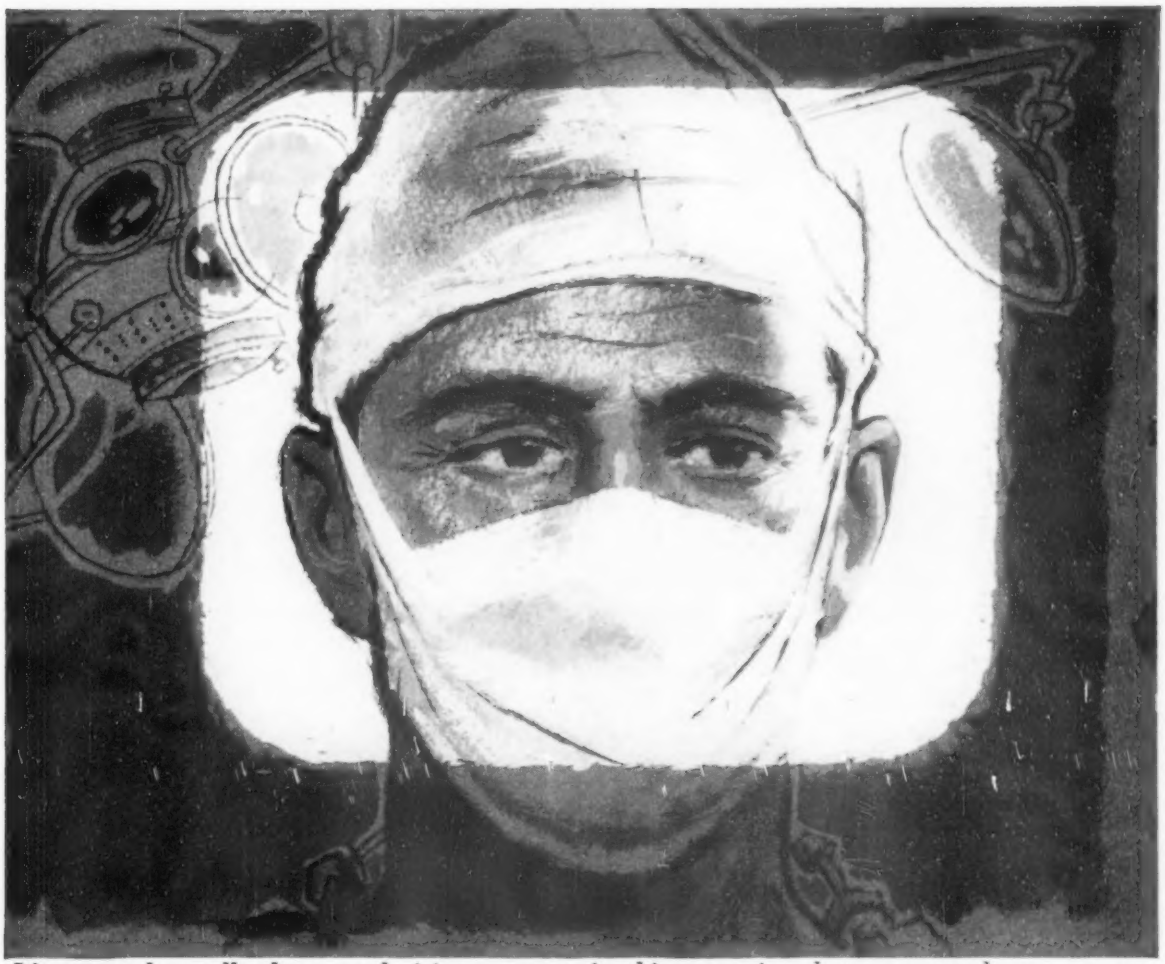
DOW THE DOW CHEMICAL COMPANY presents

a great new dramatic television program . . .

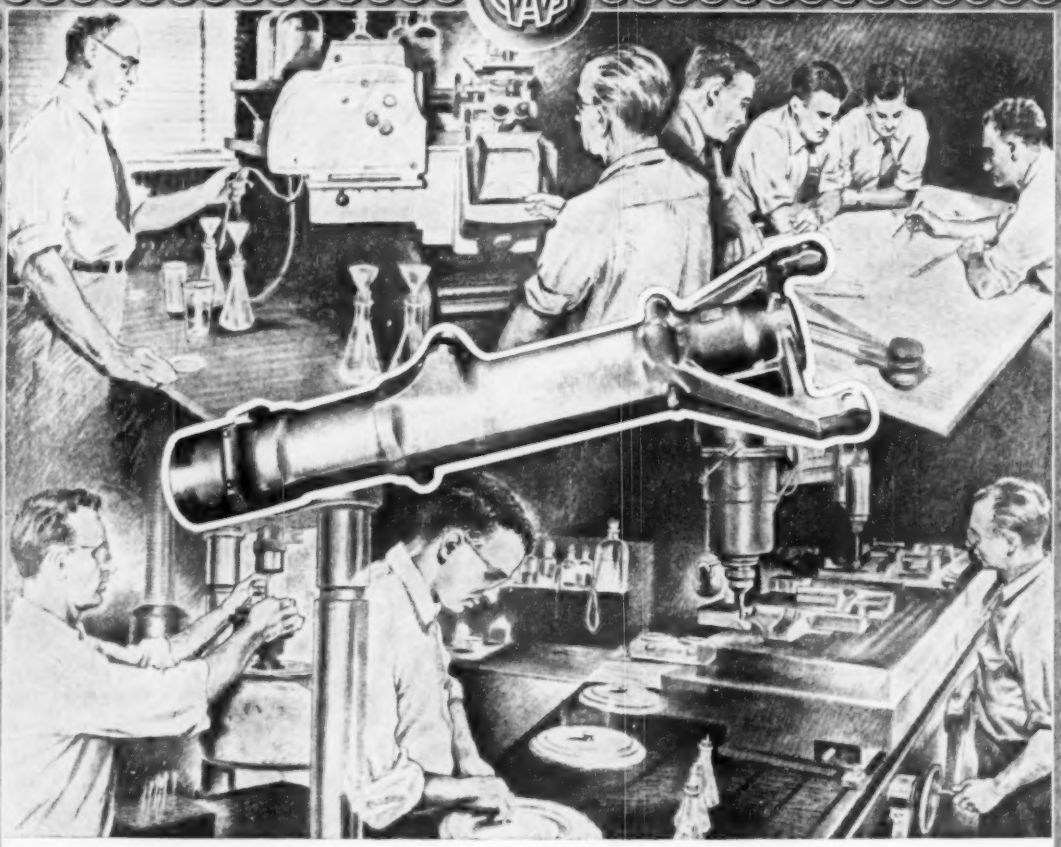
MEDIC



It's unusual to talk about a television program in this magazine, but we wanted you, our customers and friends, to hear about MEDIC first . . . we honestly believe it to be the most exciting new dramatic production in years . . .

Startling in its realism and honesty, MEDIC is based on case histories and carries the official endorsement of the Los Angeles Medical Association; produced under their technical supervision by Worthington Miner, originator of *Studio One;* created and written by *Dragnet* writer, James Moser. Don't miss the first performance September 13! The Dow Chemical Company, Midland, Michigan.

See MEDIC Monday Nights 9 to 9:30 EST, NBC-TV DOW



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HARVEY, ILLINOIS DETROIT, MICHIGAN

NEWS DIGEST

Domestic

Forty nonskeds completed a year of operations without a single fatality Sept. 1, Air Coach Transport Assn. reports.

North American Aviation is moving Navy T-28B trainer production to its Columbus (Ohio) Division to make room at California plants for expanded guided missile and electronic development and USAF jet fighter output.

Convair B-36 won Strategic Air Command's three-day "World Series of Bombing" last week at Barksdale AFB, Shreveport, La., topping scores chalked up in the meet by a B-47 and B-50.

Pilot production line for J69 turbojet engines will be set up by Continental Aviation & Engineering Corp. at Detroit under a new $2-million USAF facilities contract. First production J69 is scheduled for delivery early next spring.

Trevor Gardner, Assistant to the Secretary of the Air Force for Research and Development, is on a two-week trip to Europe. In addition to Britain's SBAC Flying Display at Farnborough, he is expected to visit some USAF offices on the continent.

New C-band airborne weather-detection radar gear will begin rolling off production lines at Radio Corp. of America's Camden, N. J., plant—eight months ahead of schedule.

New $14-million terminal was opened officially at San Francisco's International Airport Aug. 27, completing a $50-million development program at the field (AVIATION WEEK June 21, p. 21).

Seaboard & Western Airlines has won a $3-million military airlift contract to transport freight and personnel between the U.S. and installations in Western Europe. The operation will begin Oct. 1 and continue for six months.

Bid openings on surplus aircraft hardware are set for Sept. 8 at 11 a.m. by Republic Aviation Corp., Farmingdale, N. Y. Included are bolts, nuts, screws, bushings, busbars, stainless steel cable, clamps. Total cost to Republic: $75,000.

Three guided missile tracking devices, consisting basically of telescopes, will be developed for USAF by Perkin-Elmer Corp., Norwalk, Conn., under two contracts totaling $750,000.

First H-21 Work Horse of six ordered by Royal Canadian Air Force has been delivered by Piasecki Helicopter Corp. at its Morton, Pa., plant.

Turboprop Lockheed YC-130 Takes Off

Only about one-third the usual takeoff run required by large transports was taken by Lockheed's new turboprop YC-130 freighter prototype on its first flight at Burbank, Calif., Aug. 23. The plane flew to Edwards AFB, where it is undergoing extensive tests. Production models will be turned out at Lockheed's Marietta, Ga., facility as the C-130A. Powerplants are Allison YT56s turning three-blade Curtiss-Wright Turbolectric props. Production Engineering story on new freighter begins on p. 26.

Rheem Manufacturing Co.'s Research & Development Laboratories now has prime defense exceeding $4.5 million for items covering "guided missiles, ordnance and strategic warfare."

Parabolic antenna weighing 8,500 lb. and 60 ft. in diameter is being tested at USAF Cambridge Research Center's antenna test station near Ipswich, Mass. The device, capable of focusing radio energy into a highly directive beam, will be a primary part of air defense communications.

Emergency arresting gears, similar to that used on aircraft carriers, are in operation at six locations on runways at Lambert-St. Louis Municipal Airport, the first commercial field to install the system. Total cost: $400,000, shared $250,000 by McDonnell Aircraft Corp. and $150,000 by the city.

Daniel Guggenheim Medal award will go to Hon. Clarance D. Howe, Canadian Minister of Defense Production and Minister of Trade and Commerce, at the national aeronautic meeting of the Society of Automotive Engineers Oct. 8 in Los Angeles. Howe will be honored for "initiating and organizing commercial air routes and services, promoting aeronautical research, development and production of aircraft and engines, and advancing the state of aeronautics."

Financial

Lockheed Aircraft Corp., Burbank, Calif., reports net earnings of $10,864,600 for the first half of 1954, a 20% increase over the same period last year. Net sales totaled $405,389,000. Backlog June 30: $1,171,135,000.

Western Air Lines reports a net income of $270,840 for the first half of this year, compared with $412,388 for the same period of 1953. Operating revenues increased from $10,876,332 last year to $11,018,186, but expenses gained from $9,958,349 to $10,893,810.

International

Bristol Aeroplane Co. has developed a new twin-spool free-turbine turboprop, the B.E. 25, for its Britannia transport. Future Britannias, after the Mk. 300, will be powered by the new engine—designed to develop 4,000 eshp. at sea level and hold that power to 25,000 ft. before normal rated power falloff begins to be affected by altitude (AVIATION WEEK Dec. 14, 1953, p. 32). The B.E. 25 apparently is a result of breeding the Proteus with the Olympus to get best features of each.

Gannet T. Mk. 2, Fairey Aviation Co.'s anti-submarine operation trainer, has made its first flight and is scheduled to perform at the Society of British Aircraft Constructors' display next week at Farnborough.

Silver City Airways has been granted a copter license by Ministry of Transport & Civil Aviation to operate over the airline's cross-Channel routes. SCA plans to operate Westland-Sikorsky S-51s on freight services over these routes beginning April next year.

as others see us . . .

A user tells how AETCO SERVICE helped him

L. A. MAJNERI
President & Chief Engineer
Aeroguild, Inc.

Recently when conducting tests on one of our experimental shuttle valves, we arrived at contradictory and inconclusive results. To cancel out the doubtful effects of our test procedure, we decided to secure the testing service of a competent, independent organization. We desired to obtain a cross-check of our results, and if possible, to procure some conclusive data.

Consequently, we chose AETCO to conduct this test since they are acknowledged specialists in testing and evaluating aircraft components. Their experience and background in the problems of aircraft hydraulic components well qualifies them to do such testing effectively.

AETCO tested the valve for us promptly and efficiently. The result of their test furnished us, without delay and at reasonable cost, the basis for definite evaluation of our product. They rendered us excellent service, and will in the future receive first consideration from us on all test programs necessitating such outside testing service.

We are grateful that such service as theirs is available to us, and we should be pleased to recommend it to others who have similar testing problems.

Aetco

GENERAL AIRCRAFT COMPONENT TESTING
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Hydraulic, pneumatic, electric (400 cycle, AC-DC) and mechanical
IN FLIGHT TESTING, TOO

AIRCRAFT EQUIPMENT TESTING COMPANY
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7—Lockheed; 9—(top) Wide World; (center) Chance Vought; (bottom) Howard Levy; 17—Sperry Gyroscope; 21, 22, 24—Coy Watson; 26—Lockheed; 39—McGraw-Hill World News; 42—(top right, bottom left) GE Research Lab; (bottom right) P&WA; 74—Convair; 77—Boeing.

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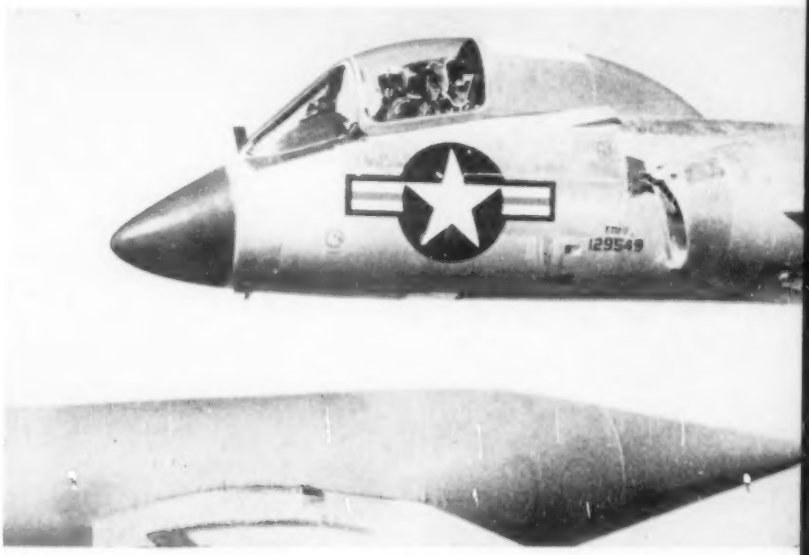
PROTOTYPE OF BRITAIN'S new Folland Gnat lightweight fighter is the Midge, shown in a demonstration flight Aug. 28. Midge is underpowered with a 1,640-lb.-thrust Armstrong Siddeley Viper, reportedly hits 600 mph. Gnat will get more powerful Bristol Orpheus turbojet.

New Views Of Military Aircraft

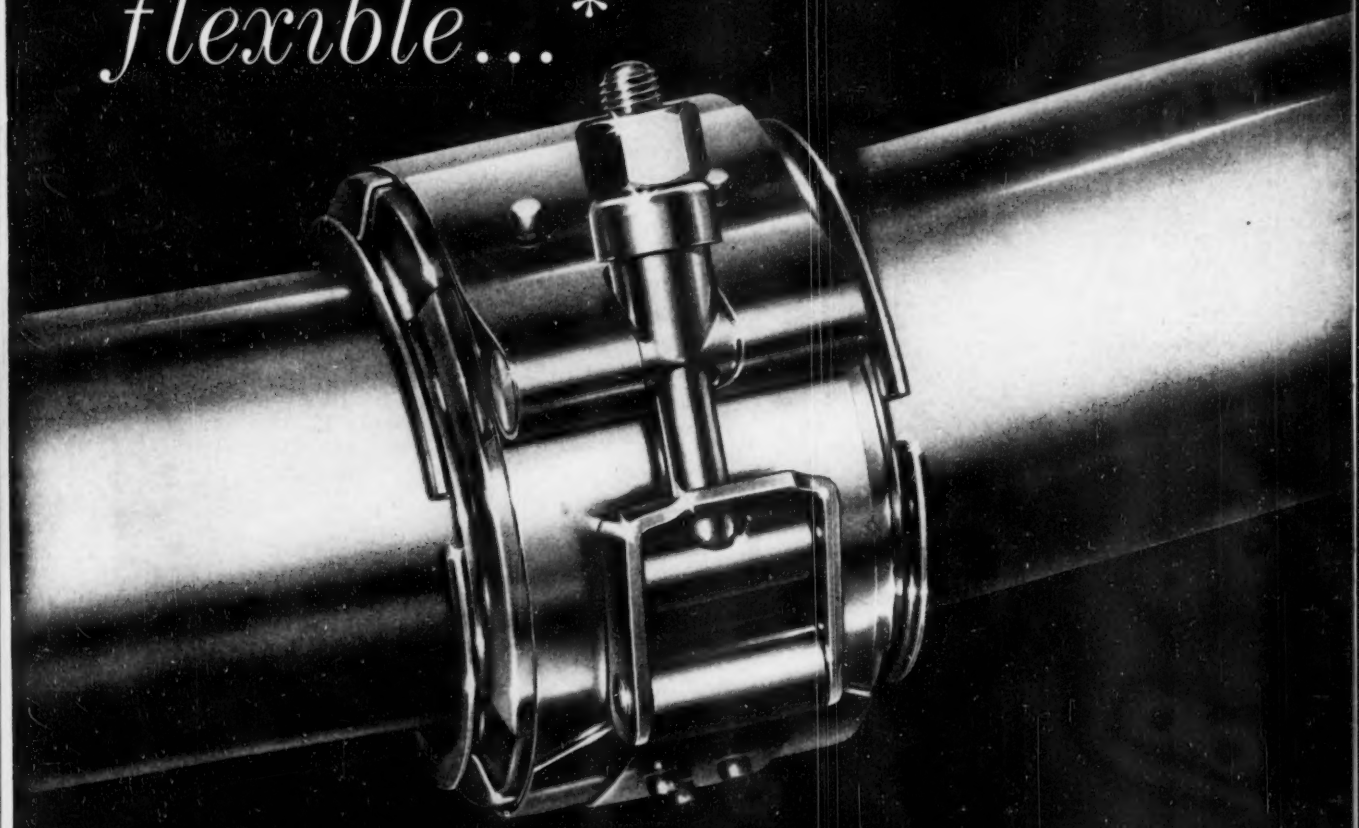


COBRA-LIKE NOSE of Chance Vought's F7U-3 pokes alongside the tiptank of a Lockheed T-33 jet trainer during a 500-mph. flight over Dallas. The tail-less 650-mph. Cutlass, powered by two Westinghouse J46 turbojets of 6,000 lb. thrust each, is being delivered in quantity to Navy fleet operation units. Production of the F7U probably will be phased out this year and the A2U-1 put on Chance Vought's Dallas assembly line.

ARMED PROVOST, Hunting Percival Aircraft's Mk. 1 trainer, carries two 250-lb. bombs and has two .303-cal. machine guns in wings.

JET PROVOST is the latest British trainer to roll out at Hunting Percival's plant. It is powered by an Armstrong Siddely Viper Mk. 5.

*flexible...**

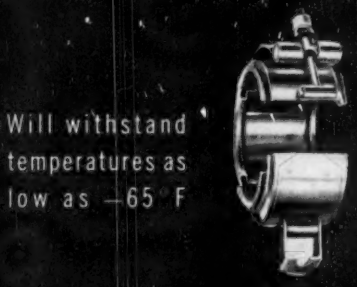


MARMAN* *FUEL LINE* COUPLING

CONVAIR specifies the Marman C-11 flexible fuel line coupling for its latest supersonic interceptor and for the nation's first turboprop seaplane.

Seal carries no duct load . . . no special tools are required . . . the seal is perfect even if tubing beads are not. **Substantial weight saving and proved reliability are paramount features.**

Will withstand temperatures as low as —65° F



. . . misalignment as much as plus or minus 5 degrees.

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WHO'S WHERE

In the Front Office

John P. Riddle, founder of Riddle Airlines who sold the airfreight carrier in 1953 then regained control last May, has been elected president. **William R. Boyd,** former president, now is executive vice president.

Brig. C. S. Booth has resigned as senior Canadian representative to International Civil Aviation Organization at Montreal to become Assistant Deputy Minister of Transport at Ottawa.

Cleemann Withers is new vice president-manufacturing, engineering and sales for Jacobs Aircraft Engine Co., Pottstown, Pa.

H. E. Riggins has been elected vice president-contract administration of Radiophone Co., Van Nuys, Calif., subsidiary of Northrop Aircraft, Inc. Other changes: **John R. Jacobsen,** chief engineer; **Col. William P. Patterson,** assistant director of the Weapon Systems Division.

George Dart has become vice president and eastern sales manager for Pacific Air Freight, Inc., Seattle.

Arthur E. Abney has been appointed director of the Illinois Department of Aeronautics, succeeding **Joseph K. McLaughlin,** who resigned.

Robert E. Johnson, vice president and assistant to the president of United Air Lines, and **Paul A. Bissinger,** San Francisco businessman, have been elected to UAL's board.

Brig. Gen. P. M. Hamilton (USAF Ret.) has joined the board of directors of Hiller Helicopters, Palo Alto, Calif.

Revere G. Sanders, former vice president of Fairchild Camera & Instrument Corp., is new assistant to the president of Aeroflex Laboratories, Inc., Long Island City, N. Y.

Changes

Ira G. Ross has moved up to director of Cornell Aeronautical Laboratory, Buffalo. **Will M. Duke** is new associate director.

A. W. Morgan, former executive vice president and general manager of Pachmayr Gun Works, Inc., has joined Convair as assistant to the manager of the San Diego Division.

Charles W. Hosterman has become assistant general manager of Sylvania Electric Products' Electronics Division, Woburn, Mass.

Honors and Elections

Joseph J. O'Connell, Jr., onetime chairman of the Civil Aeronautics Board and now Washington, D. C., partner in the law firm of Chapman, Bryson, Walsh & O'Connell, has been appointed chairman of the annual Wright Day Dinner, to be held Dec. 17 in Washington.

Franklyn I. Young, operations manager of Trans-Canada Air Lines, has won the McKee Trans-Canada Trophy for "outstanding work" in organizing the National Air Show at Toronto.

William D. Greenfield, aeronautical engineering graduate from the University of Illinois, has won the $2,000 Hiller Helicopter Fellowship for 1954-55.

INDUSTRY OBSERVER

► Atomic Energy Commission is pushing development of nuclear supply plants to furnish electricity for defense plants. AEC says nuclear powerplants can be widely scattered to supply key defense production areas, built underground where they will be invulnerable to air attack, and can store a 20-year supply of fuel in the space occupied by an ordinary closet.

► Convair R3Y-2 Tradewind transport flying boats are getting stiff workouts in the San Diego flight test program. Missions up to six hours are being flown and the Allison turboprop engines are getting critical workouts in touch-and-go landings on San Diego Bay.

► Helicopters and improved weapons are credited by the Marines with a marked increase in combat efficiency of standard tactical units. As a result 61 officers and 1,404 enlisted men have been eliminated from each Marine combat division. James H. Smith, Navy Assistant Secretary for Air, says further economies in personnel and increases in striking power can be affected by this combination.

► Convair's B-36 bomber has a safety record well above Strategic Air Command average despite two fatal accidents within 24 hours that killed 25 SAC crewmen. B-36 had lowest accident rate of any USAF bomber in 1953 and during first six months of 1954 averaged nine accidents per 100,000 hr. flown. Average for all planes flown by SAC was 14 per 100,000 hr. for the same period.

► Lockheed's turboprop Super Constellation has been designated the YC-121F by USAF. The two planes on order will be powered by P&WA T34P-6 turboprops. Navy has two similar planes on order designated R7V-2.

► Small business firms were awarded 7.1% of the total dollar volume of Air Force prime contracts during the first six months of fiscal 1954. This compares with 4.5% for the period 1943-45 and 6.2% during 1951-53.

► USAF is making more extensive use of commercial maintenance and overhaul facilities. Volume of such work is estimated to reach about $500 million in 1955. Percentage of this type of work going to commercial firms has risen from 21% in 1952 to an estimated 41% in 1954. About 96% of the retreading of aircraft tires will be done by commercial firms in 1955.

► Location of specific sites for aircraft control and warning facilities has not been fixed in many cases pending technical and engineering surveys now being conducted by USAF. Once they are picked, construction can be started at once only if the site happens to be on a military installation. Otherwise, delays will be faced while necessary rights-of-way are obtained through legal means. This is the reason why USAF asked for less than $60 million in fiscal 1955 toward a program that will cost $110 million, according to present plans.

► NACA has come up with a new approach to solving the helicopter noise problem. Its technical report says: "One way in which the noise problem may be alleviated is to separate the observer by a sufficient distance from the source of the noise."

► Convair's delta-wing XF2Y-1 Sea Dart has exceeded the speed of sound in a shallow dive from 34,000 ft. with test pilot C. E. Richbourg at the controls. The Sea Dart still reportedly is suffering hydro-ski buffeting at high taxiing speeds, despite a variety of attempted fixes.

► New-type "intrinsic barrier" transistor, developed by Bell Labs, has been operated at frequencies as high as 440 mc., many times higher than previous limit, opening new applications in UHF and microwave equipment.

► Convair's XB-58 Hustler may become first "transistorized" warplane. It already is slated to use Eclipse-Pioneer's transistorized autopilot and Minneapolis-Honeywell's transistorized fuel gage. Convair reportedly is urging other avionic contractors to use transistors wherever possible.

Washington Roundup

Cost Allowances

Armed Services Procurement Regulation Committee has received comments of the Army, Navy and Air Force on proposed revision of Section 15, covering cost allowances. Following evaluation, the suggested new rules will be modified for a second time. First revision was made more than three months ago, after industry had reviewed the proposed changes, and contractors are scheduled to get another chance to offer their comments this fall.

The controversial Section 9, dealing with patents, also is undergoing revision. Two sections already have been submitted to industry for their ideas, and a third will follow soon. Pentagon procurement spokesmen emphasize that rules still are in state of flux and they do not anticipate a final set will be issued before early next year.

Research Trend

Aircraft industry is watching closely what appears to be the beginning of a new trend in the Air Research and Development Command to concentrate on basic research and leave development of specific hardware to Air Materiel Command sponsorship. Meanwhile, AMC-ARDC relations are being smoothed by monthly conferences between Gen. Edwin W. Rawlings, AMC commander, and Lt. Gen. Thomas Power, ARDC commander.

Russian Competition

Pentagon observers are wondering how long top-level Defense Department officials will persist in their public depreciation of Russian progress in jet propulsion, high-speed aircraft and missiles before they have to do a quick switch to support an increased airpower budget for fiscal 1956.

Despite incontrovertible evidence of Russian progress furnished by USAF and the Russians themselves, the highest-level civilian Defense Department officials still refuse to face the unpleasant facts and are attempting to assure the American public that we are far ahead of the Russians in key atomic airpower development.

Despite official Defense Department propaganda on U.S. missile progress, development of military useful missiles still is lagging badly with no signs of the thorough overhauling the missile program has needed for so long.

Air Defense Resurgence

Watch for USAF's air defense efforts to rise to a par with Strategic Air Command in competing for a major share of the USAF budget, good personnel and equipment. After an early "Maginot Line" condemnation of increased continental air defense efforts, USAF now is convinced of the necessity for improved air defense system. Tactical Air Command is likely to be squeezed hard in future budget competition between SAC and ADC.

USAF Shifts in Orient

USAF is jockeying for better position in the Orient. Recent shift of 5th Air Force Headquarters and the bulk of its aircraft, including F-86 fighters from Korea to Japan, was aimed at bringing about these two improvements:

- Japanese bases are far enough removed from the growing Communist air strength in North Korea to provide sufficient warning to repel air attacks. Communists have built up a formidable force of MiG-15 fighters and Il-28 jet bombers in North Korea only a few minutes by air from USAF bases in South Korea. USAF planes at Korean bases would be sitting ducks against a swift surprise attack by the Reds.
- Japanese bases are not subject to the anti-modernization provisions of the truce. USAF can re-equip units based in Japan with more modern equipment. Units in Korea must maintain the type equipment they had when the truce was signed.

Meanwhile, USAF also will replace its B-50 Strategic Air Command wing at Guam with a wing of B-36 heavy bombers capable of striking deep into the heart of Asia from the Mariannas.

Airlift Struggle

Watch for another bitter battle between the scheduled and nonscheduled airlines over the lion's share of any future military contract airlift involved in the USAF logistics-for-1956 plan to move high-cost, critical equipment by permanent airlift.

At the present time USAF thinking favors increased use of nonskeds on the basis that they offer lower costs than scheduled airlines.

AF Construction Victory

Another significant success has been achieved by USAF in its efforts to direct its construction program, bulk of which now is being handled by the Army Corps of Engineers.

Defense Department directive No. 4270.5 says the Air Force may now "design and construct under its own supervision (1) research and test facilities peculiar to aircraft development and other technical facilities of specialized design or requirement and (2) other projects which the Secretary of the Air Force advises the Secretary of Defense will be undertaken by the Air Force except as the Secretary of Defense may otherwise direct."

Details of handling the program have not been worked out by the Air Force. Work under way at such projects as the Arnold Engineering Development Center at Tullahoma, Tenn., probably will continue to be directed by the Army Engineers.

"Each project will be handled individually," an Air Force engineer says. "The decision will be based on our capability to do the job."

Trend toward Air Force control of its constructon was evidenced when Maj. Gen. Lee B. Washbourne was named an Assistant Chief of Staff for Installations, reporting directly to the USAF Chief of Staff rather than through the Deputy Chief of Staff for Operations (AVIATION WEEK Apr. 12, p. 12). He became, in effect, an Air Force chief of engineers.

In addition, control of aviation engineers which formerly had been under the Army, earlier was shifted to the Air Force.

—Washington staff

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CAB Serves Notice on Feeders:

No Subsidy for New Local Service Flights

- **Board policy, detailed in the cutback of Piedmont's mail pay, sets back hopes for permanent certificates.**
- **Decision holds the government should not underwrite additional services if they are not self sufficient.**

By Katherine Johnsen

Civil Aeronautics Board has dampened the hopes of local service airlines for permanent certificates in an order cutting back mail pay for Piedmont Aviation and highlighting the "increasing dependence" of feederlines on government support.

By a hairbreadth, the local service carriers missed obtaining legislation directing permanent certification from the recently adjourned Congress.

The feeders argued they already had demonstrated economic stability and needed permanency to improve further their financial position.

▶ **Mohawk Application**—Capitalizing on the strong political support, Mohawk Airlines, temporarily certificated to 1958, filed with CAB for permanent certification shortly after the congressional adjournment.

Mohawk says it needs a permanent certificate for these reasons:

- To assist in obtaining equity financing.
- To assure retention of personnel.
- To improve ability to plan future operations.

Two of the strongest local service lines, Mohawk and Piedmont have been awarded maximum-term, seven-year certificates by CAB. Piedmont has the lowest cost level of the 14 feeder airlines.

▶ **'Increased Dependency'**—The decision in the Piedmont mail case made it clear that CAB is thoroughly dissatisfied with "the current trend toward increased dependency upon subsidy support" of the local airlines and, emphatically, is not disposed to certificate them permanently.

The decision declared: "The Board is not satisfied that the industry, as a whole, has explored to the fullest extent all possible methods of narrowing the gap between operating expenses and revenues. . . .

"It is incumbent upon the management of the local service airlines to do so, for we believe that the success of the local service experiment . . . depends in large measure upon their ability to bring about a continuing trend toward ultimate self-sufficiency. This, in turn, depends to a large extent on the local service airlines achieving the optimum productivity and maintaining an increasingly favorable balance between costs and revenues.

"If costs go up—whether it be the cost of gas, parts, or wages and salaries for management or other personnel within the organization—such increased costs should be met through increased commercial revenues or they will tend, in the long run, to defeat or to minimize the scope of the local service experiment."

▶ **CAB Policy**—In its decision, the Board disallowed $179,783 in mail pay to Piedmont for the year ended Sept. 30 on the grounds that the carrier, by increasing flights, had reduced load factor.

The mail pay disallowance, the Board said, reflected "nonrecognition" of the 530,000 additional miles flown by Piedmont over the previous year. The airline's load factor dropped from 45.90 in 1953 to 45.50 in 1954. The Board had approved Piedmont's plan to increase its mileage by 530,000 in anticipation the load factor would reach 46.67%.

Declaring that "the added mileage will not be underwritten with subsidy," CAB said:

"This view is bottomed on the principle, which we will apply to all carriers similarly situated, that where a carrier is operating more than a minimum volume of services over its system and has not reached an optimum load factor, the government should not properly be called upon to underwrite with increased subsidy an increase in the carrier's need attributable to a decline in load factor resulting from the addition of schedules."

The Board said it "expects management to examine, with the utmost care, the productivity of each and every schedule in order not to place an unreasonable burden on the government."

It added: "If progress toward self-sufficiency is to be maintained, ceaseless efforts must be made to narrow the gap between costs and revenues. We anticipate that by even closer vigilance on scheduling, the local service carriers will be able to move towards closing the gap by elimination of the costs of unwarranted flights."

CAB Action May Provoke Congress

Civil Aeronautics Board's action in refusing mail pay to Piedmont for additional service, after approving the plan, is likely to provoke congressional criticism.

A similar case, in which the Board decided on re-consideration to make a disallowance to a local service line, brought widespread disapproval. In a formal report, issued shortly before adjournment, the House Interstate and Foreign Commerce Committee singled out this action for criticism.

Referring to CAB's refusal of mail pay for Pioneer Air Lines to finance Martin 2-0-2s, the committee declared: "In certain cases . . . it appears that CAB has been unduly severe. Where one carrier is retroactively penalized in a mail-rate conference for business decisions previously taken with the knowledge of the Board, the consequent damage to the future initiative of all carriers exceeds the immediate monetary saving to the government.

"The Board has responsibilities which it must observe, but on the other hand it must allow carrier management a sufficient amount of discretion and initiative to enable them to fully develop their companies."

In the Piedmont case, CAB explained that "a prime factor in the recognition of (additional) mileage, on an experimental basis, was the anticipation that the carrier's system load factor would rise. . . . The Board has since re-examined the record. . . . This additional information does not show the anticipated increase in passenger load factor. . . ."

250 Changes in TCA Viscount

First turboprop Vickers Viscount to be delivered to Trans-Canada Air Lines in October will incorporate approximately 250 modifications specified by TCA.

Jack Dyment, TCA chief engineer, told Aviation Week that among the major changes is a redesigned cockpit to make the plane operable from either the left or right positions. Most British cockpit equipment also has been replaced by U. S. instrumentation, he said.

The undercarriage has been redesigned for smoother ground handling and Dunlop-Maxaret braking control has been installed.

Other changes include: modification of engines to facilitate low-temperature starting; automatic flame temperature control developed to reduce the load on pilot under warm temperature conditions.

It is assumed that most of the changes specified by TCA will be incorporated in the fleet of Viscounts ordered by Capital Airlines, since both operate under approximately the same conditions. Both airlines have ordered the Series 700.

Dyment said TCA plans to start Viscount service Feb. 1 on its Montreal-Toronto-Winnipeg route. Other starting dates: Mar. 1, Toronto-New York; Apr. 1, Montreal-New York, Toronto-Chicago and Toronto-Windsor.

Trans-Canada expects to have 14 of the turboprop transports in service by Apr. 1. Company has ordered 22.

TCA brought its total Viscount order to 22 last week with the purchase of an additional seven. Airwork, Ltd., a British independent airline, bought three. Trans-Canada's new order calls for delivery of three planes in March 1956 and four in March 1957. Airwork will get its planes during the first half of 1956.

The new orders bring Vickers' backlog for the turboprops to 153.

MATS Chief Outlines Jet, Turboprop Needs

Seattle—Lt. Gen. Joseph Smith, commander of the Military Air Transport Service, says USAF wants a jet transport that can travel 3,000 to 3,500 nautical miles nonstop at a speed of not less than 500 knots (575 mph.).

For a slower turboprop freighter, he says requirements call for an aircraft that can carry 50,000 lb. of payload over a distance of 3,500 nautical miles.

"We believe that there are many compelling and valid reasons for introducing jet transports into the MATS fleet," asserts Gen. Smith.

Recent first flights of Boeing Airplane Co.'s Model 707 tanker-transport and Lockheed Aircraft Corp.'s C-130 airfreighter add emphasis to Gen. Smith's remarks, delivered before the Institute of the Aeronautical Sciences turbine air transportation session here.

▶**Specialized Transports**—The concept of a multi-purpose aircraft for MATS no longer is valid, Gen. Smith told the session (Aviation Week Aug. 23, p. 15). "We must now have one type of aircraft for the express purpose of transporting personnel and wounded and another type exclusively for hauling freight," he said.

MATS believes jet transports should be used as specialized personnel carriers over its high-density routes across the Atlantic and Pacific, according to Gen. Smith.

He says the specifications for such a transport call for a payload of either 30,000 lb. or 100 passengers. It must be able to operate from the average airfield with runways 5,000 to 6,000 ft. long without the use of assisted takeoff boost or drag-chute braking.

Some system of reverse thrust therefore is considered mandatory.

▶**Easy Transition**—"The jet transport we are looking for should be relatively easy and simple to operate and certainly no more complicated than the conventional transport," the MATS commander says. "We cannot, for example, accept limitations in performance so fine that a one- or two-degree change in pitch during takeoff will be critical."

Easy transition from conventional aircraft is a requirement since the jets must be operable by the average Air Force crew of a level of competence expected during emergency mobilization.

Easy servicing, rapid loading and unloading and rapid refueling of the aircraft must be possible. Overall maintenance must be simplified and subject to accomplishment by "our unstable and partially skilled military labor force."

Equipment of MATS and the commercial airlines should be standardized as closely as possible since the reserve fleet in time of war will be mobilized from the airlines.

▶**Turboprop Economy**—In regard to a turboprop cargo carrier, the MATS commander says speed in such a transport is not regarded as critical but it must be compatible with maximum overall economy of operation.

MATS studies indicate a turboprop transport carrying a 50,000-lb. payload over 3,500 nautical miles is about the optimum in the foreseeable future if frequency of service and economy are both considered. Gen. Smith defines the "foreseeable future" as the period from the present through 1960.

Like the jet transport, this turboprop aircraft must be capable of operating without external assistance out of medium-size airfields with runways of 5,000 to 6,000 feet and, like the jet, must be capable of fast turn-arounds through rapid handling and ease of maintenance.

"Reliability is overriding in cargo operations if we are to realize the potential of our airplane," Gen. Smith says. "The importance of simplicity and accessibility for ease of maintenance cannot be overstressed."

Such an aircraft would permit MATS to reduce its relative manpower, facility and supporting equipment requirements through a reduction in the number of airframes required to do its job, he notes.

▶**Future Freighter**—"Of course," the MATS commander continues, "we all know that there are even larger cargo aircraft under development which will carry in the neighborhood of 100,000-lb. Success of these projects is dependent upon development of new powerplants.

"Much has to be learned about the operation and utilization of transport aircraft of this size. Such an aircraft could replace 25 C-54s, eight C-97s, eight to nine C-118s and seven to eight C-124s."

Meyers Four-Placer To Cost $17,500

Production of a new four-place, single-engine personal plane—to cost approximately $17,500—is expected to be started early next month by Meyers Aircraft Co., Tecumseh, Mich.

Designated the Model 200, the all-metal aircraft will be powered by a 225-hp. Continental O470 engine and is designed for a cruise speed of about 165 mph. at sea level. Cruise speed at approximately 6,000 ft. optimum altitude is estimated at 185 mph. The Model 200 has averaged 184.5 mph. in three passes at 6,500 ft., according to A. H. Meyers, president of the company.

Meyers also has a smaller, all-metal plane with fixed landing gear in the planning stage, aimed in the $4,500 price range. But there are no indications that this model is a definite item at present.

The firm has built approximately 40 two-place Model 145 personal planes since 1948. Up to approximately a year ago, Meyers also was engaged in military subcontracting on the Beech T-36, Fairchild C-119 and Chase (now Fairchild) C-123.

RADFORD: Not more, but better.

HINSHAW: Room for brains and ideas.

WHITE: All the world's our theater.

Hinshaw Tells American Legion . . .

Nuclear Power Means New Kind of War

By Claude Witze

The American Legion last week threw its weight behind a renewed drive for Universal Military Training and a large standing army despite a strong plea by Rep. Carl Hinshaw for a change in its traditional policy to meet the impact of atomic power on national defense.

Hinshaw, chairman of the Research and Development Subcommittee of the Joint Congressional Committee on Atomic Energy, told the Legion's Security Commission that tomorrow's war will be so different from those fought since 1915 that most of the military concepts they harbor, as well as some of their nationalistic ideas, are outmoded.

Hinshaw's views:

• **Air war.** "Here we can foresee . . . nuclear and thermonuclear weapons . . . that can readily be transported by aircraft to any point in the world or installed in the warheads of guided missiles. In fact, we may be approaching the point where we can see the end of the manned bomber, and we may well be entering the era of true push-button warfare.

"A missile launched from one continent will have the capability of being unerringly directed to a target in another continent; such missiles can carry warheads capable of vast destructive power. What with radar and ground-to-air missiles equipped with automatic detonating atomic warheads, the defense fighter may also be on its way out. No more will we see the cavalier duels of the days of Eddie Rickenbacker and Von Richthofen," he said.

• **Aircraft.** ". . . Nuclear power offers the first real hope for supersonic aircraft of unlimited range. In the nuclear powerplant for the first time we have an almost inexhaustible source of power which requires, for all practical purposes, zero weight of fuel.

"This means that an aircraft will be able to take off from this continent, cruise over any portion of the world and carry out any desired military mission. The duration of the mission will be determined only by the endurance of the crew."

• **Navy.** ". . . We have already commenced building what should ultimately be a large fleet of nuclear-power submarines. . . .

"Presumably, such a vessel could be equipped with atomic warhead torpedoes capable of destroying a convoy in one strike. The battleship admiral went into limbo with the coming of the airplane, and the atomic submarine is about to consign carrier admirals to the same fate."

• **Scientific talent.** "We would do well to consider carefully whether or not our official attitudes toward foreign-born scientists and engineers . . . are really serving the cause of freedom. It is not a nice thing to think that the very men and women who would help us win this atomic race . . . are being barred from doing so. . . .

"Do we really appreciate the tremendous dependence of our nation on the scientists and engineers? Do we fully realize that one man with an idea on how to guide an intercontinental missile to its target with accuracy is worth thousands of men in uniform? I urge you to think . . . for time is running out."

• **Atom power in peace.** "Nuclear-powered airlines . . . will annihilate distances. . . . Our splendid isolation is indeed a thing of the past."

• **How to reach these goals.** ". . .It is not the great numbers that count, but the few great ideas and the great brains that developed them. . . . We must make more room for the development of brains."

▶ **Additional Emphasis**—Other speakers representing the military services and the aircraft industry put additional emphasis on the importance of research and the development of quality weapons in the scientific race now under way between East and West:

• **Adm. DeWitt C. Ramsey,** president of the Aircraft Industries Assn., said America's effort "must provide for the building of new prototypes and the development of new materials and fabrication methods . . .

"It will require intensive basic research effort, leading to new knowledge, though not necessarily aimed at the creation of a specific end product."

• **Gen. Thomas D. White,** USAF, Vice Chief of Staff, warned that airpower has changed the nature of war and given the military mobility and flexibility as their strongest assets.

"The air front is invisible and also indivisible," Gen. White said. "In a world war, the air theater is the world."

• **Adm. Arthur Radford,** chairman of the Joint Chiefs of Staff, said: "Our best chance of matching totalitarian manpower is by having superior-quality manpower . . . with superior weapons. . . .

"We have to devise, develop, test and produce equipment superior to that produced by any other nation . . . to keep our forces paced with changing needs and changing techniques."

• **Rear Adm. Apollo Soucek,** chief of Navy's Bureau of Aeronautics, asserted that "airpower can never be static. There must be continuous progress in the field of research and development."

Lewis to Tour British, European Plane Plants

Roger Lewis, Assistant Secretary of the Air Force for Materiel, will leave Sept. 9 on a three-week tour of Europe and North Africa to monitor USAF's offshore procurement program.

He will visit Air Force installations and aircraft plants in England and on the continent.

His itinerary includes:

• **Germany.** USAF headquarters in Weisbaden, where procurement responsibility is vested for all European offshore purchasing.

• **France.** Conferences with Gen. Lauris Norstad, air deputy of SHAPE, and Gen. Orval R. Cook, deputy European commander. He also will visit the Dassault plant at Bordeaux, manufacturers of the Mystere fighter.

• **Belgium.** Fabrique Nationale, Brussels, building the Hawker Hunter.

• **Netherlands.** Curtiss-Wright Europa; Fokker, building the Hawker Hunter, and KLM Royal Dutch Airlines, holder of a contract to overhaul jet engines.

• **Italy.** Fiat jet engine plant at Turin and Aerfer, in Naples, manufacturers of spare parts. Fiat is building the F-86K for NATO forces.

• **England.** Conferences with Maj. Gen. James W. Sprv, chief of the Mutual Military Assistance Advisory Group, and British supply officials.

He will tour the USAF depot at Burtonwood and these British plants: A. V. Roe, maker of the Vulcan bomber; Gloster Aircraft, builder of the Javelin all-weather fighter; Bristol Airplane Co., aircraft and engine manufacturers; de Havilland Aircraft, maker of the Vampire fighter; Hawker Aircraft, manufacturer of the Hunter fighter; Vickers-Armstrongs, which produces the Swift fighter; Rolls-Royce and Armstrong Siddeley, engine manufacturers.

In North Africa, the party will tour materiel headquarters and USAF depot installations.

Accompanying Lewis will be Lt. Gen. Donald Putt, Deputy Chief of Staff for Development; Max Golden, his deputy for procurement and production; Brig. Gen. Harley Jones, Deputy Director for Procurement and Production at the Air Materiel Command, and Col. Donald Graham, his executive officer.

Martin Leases 2-0-2 For Avionics Tests

Glenn L. Martin Co. has leased a 2-0-2 from Pioneer Aeronautical Services to test new airborne electronic equipment being developed at its Baltimore plant for USAF.

Martin believes the 2-0-2, taken over on a long-term basis from the leasing company set up by Pioneer Air Lines after Civil Aeronautics Board refused to underwrite PAL's nine DC-3 replacements, will give many hours of flight time with small maintenance and little delay in the test program.

The aircraft company decided to convert a twin-engine transport into a flying lab for its avionics project after it found the cost of simulating flight tests on the ground was too high.

Dr. Harold Schutz is project engineer for the USAF avionics development program at Martin.

Copter Record

A new helicopter speed record of 156.005 mph. has been set by an Army pilot flying the Sikorsky XH-39 over a three-kilometer course at Windsor Locks, Conn.

The former record was 146.735 mph., established Sept. 2, 1953, by a Piasecki H-21 Work Horse, flown by USAF Capt. Russell M. Dobyns on the eve of the National Aircraft Show at Vandalia, Ohio.

Warrant Officer Billy T. Wester established the new record Aug. 26 in a prevailing temperature of 80F. His average speed for four consecutive runs over the course was compiled by Charles Logsdon, official timer of the National Aeronautic Assn., and will be submitted for recognition by the Federation Aeronautique Internationale.

The S-59 is a modified S-52 with a Turbomeca Artouste gas turbine engine that develops more than 400 hp. The original S-52 had an Aircooled Motors' reciprocating engine rated at 245 hp. The turbine weighs 230 lb., against 372 lb. for the Aircooled engine.

Electronic Computers To Forecast Weather

Improved weather data, compiled by an electronic computing machine, will be available next summer to the Air Weather Service and U.S. Weather Bureau forecasters.

The figures, covering distribution of pressure, temperature, winds and vertical motion, will make it possible for civil and military pilots to compute flight plans with greater accuracy and take fuller advantage of pressure pattern routes across the country.

► **Daily Distribution**—Source of the new information will be the Joint Numerical Prediction Unit, a project of the Weather Bureau, Navy and Air Force. Present headquarters are in Washington, D. C., but will be moved to Suitland, Md., where reports will be distributed once a day starting about July 1, 1955.

Maj. Philip D. Thompson, top USAF expert on the unit's staff, emphasizes that the electronic computing machine does not make forecasts but supplies information not previously available. The information will permit forecasters to make more accurate predictions and supply some data—such as vertical air movements—not now available.

In addition to the development of electronic computers, the new information is made possible by the wartime expansion of weather services, which brings in meteorological data from a large network of observation stations.

► **Computer Application**—Mathematical computation of air movement has been possible from equations known for several decades, and experiments have been under way since 1922. It was not until 1946, however, that electronic computers were developed to the point where they could be applied to weather prediction.

Establishment of JNPU goes back to 1949, when the Geophysics Research Directorate of the Air Research & Development Command began studies paralleling those being conducted by the Institute for Advanced Study at Princeton University.

Basic job of the ARDC project was to find out how accurate predictions could be made from newly available data on the state of the atmosphere. The major problem at this point was that existing equations were too general and errors were amplified as they were applied to reported figures.

► **Simplification**—For the past five years, scientists have been working to simplify the equations and make the results more accurate. Electronic computers, doing work that would require 64,000 persons, now are able to turn out forecast data every 24 hr.

The Suitland office, which will be provided with an IBM 701 computer next March, will provide figures for forecasts at sea level and an altitude of 20,000 ft. at the outset. Later, the system will be applied to forecasts at 10,000 ft. and other altitudes.

JNPU was formed under a directive from the Joint Meteorological Committee, under the Joint Chiefs of Staff. Personnel for the unit have been trained at Princeton and in the Washington JNPU headquarters. A course also has been given by the Washington chapter of the American Meteorological Society.

JNPU is headed by Dr. George P. Cressman. In addition to Maj. Thompson, in charge of research and development, other experts working on the project are: Edwin Fawcett, in charge of the analysis section, and Dr. Joseph Smagorinsky, in charge of computations.

New Navaid

- **Sperry is producing new lightweight air radar.**
- **APN-59 has navigation, anti-collision feature.**

A new and versatile airborne radar, claimed to be the smallest and lightest system for its power and range of uses, is in quantity production at Sperry Gyroscope Co., Great Neck, Long Island, N. Y.

The new radar is basically a navigational set, designated APN-59, but it incorporates search, surveillance, cloud- and collision-warning and beacon interrogation and reception features. Total weight of the system is 150 lb.

"This is a thoroughly flight-tested, radar system in being," says USAF. Development of the set has been sponsored jointly by Sperry and the Air Research & Development Command over a number of years.

▶**Tested Unit**—Hundreds of hours of test time have been racked up on the system in environments from Alaska to Florida by Sperry and by Wright Air Development Center, Wright-Patterson AFB, Ohio.

One photo taken from the five-inch radar screen showed Buffalo and Detroit, Toledo and Toronto on opposite ends of Lake Erie, a distance of about 250 mi.

Presentation of data is like that on a PPI (plan position indicator): the picture can be either a ground map or an obstacle pattern at selected altitudes from ground level up to heights above the flight path of the aircraft.

First applications of the new aid are expected to be in troop-carrying or essential-cargo planes, but no specific installations have been announced by Sperry or the Air Force.

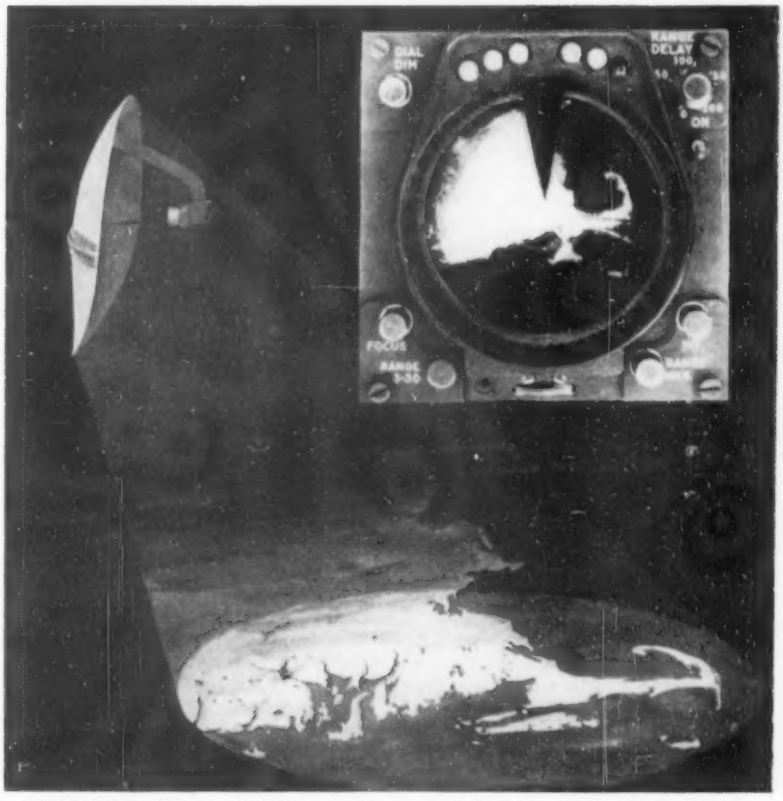
▶**System Features**—Standard antenna for the APN-59 is a gyro-stabilized "turtle-shell" shape with an 18-in. maximum dimension. An optional 30-in. antenna also is being produced for use with the system.

Scanning can be either full 360 deg. or sector scanning. For more hits on a radar target in a given time. Sweep can be nonlinear; a particular section of the presentation can be stretched for extra clarity in that area.

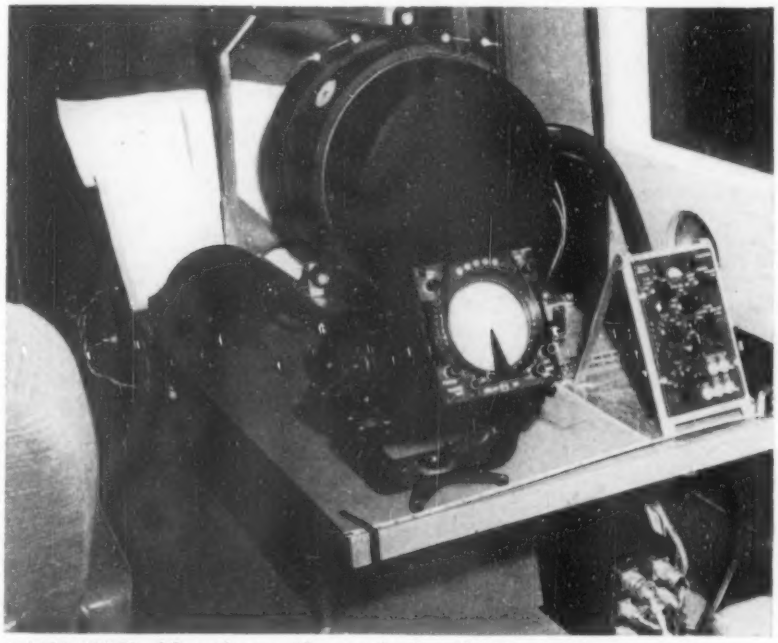
The operator can select a range scale for closeups from three to 30 mi., or alternate fixed ranges at 50, 100 and 240 mi. The presentation may be oriented to the aircraft heading, to true north or to any desired compass bearing for drift measurement.

The APN-59 operates in the X-band spectrum (10,000 megacycles). Subminiature tubes and components are used to a large extent; indicator, synchronizer and the five-inch screen all are contained within a single aluminum case whose dimensions are 6½ in. square by 16 in. long.

A Sperry spokesman says the radar probably will be released eventually for commercial applications.



TURTLE SHELL antenna of APN-59 catches Cape Cod region, reproduced on scope.



MAJOR UNITS of Sperry's new airborne radar fit easily into single-passenger space.

Wardlow Converts SR-10 to All Metal

Santa Ana, Calif.—A small West Coast firm has come up with an all-metal conversion of a Stinson SR-10 that it says gives greatly increased performance due to changes in the airplane's design.

Extensive modifications to the fuselage provide for a larger cabin and baggage area, with the aircraft now licensed as six place with 100-lb. of baggage. It also is approved on skis and floats.

"Our first conversion has now flown approximately 75-hr. on CAA flight tests, shakedown and demonstration flights," says Floyd M. Wardlow, who heads the firm. "The airplane now performs equally with the DH Beaver and A6000 Travelair, which we have run comparison tests against."

▶ **Modifications**—These are some of the changes in the aircraft, now covered with .020 and .025 24ST material:

- Large 4-ft.-wide cargo doors installed on both sides of the fuselage. These hinge upward to provide unrestricted loading of the cabin area, now 11 ft. 5 in. long.
- Installation of electric flaps, controlled in all positions rather than only two—full up or full down.
- Expanded cabin area of approximately 126 cu. ft. of cargo space, comparable to the de Havilland Beaver.
- Individual passenger seats have been installed aft of the pilot and co-pilot seats, with a large hammock seat aft of these center seats. The seats are removable for cargo or stretcher use.
- Large rear windows have been installed in the area of the hammock seat, set up in the former baggage compartment area of a stock model SR-10.
- For smoother air flow over wings, large flush type gasoline filler caps have been installed on top of the wing instead of small protruding type.
- A pilot emergency access door has been installed in the left side forward of the cargo and passenger area. This is for emergency use or access to the pilot area if the ship is loaded with cargo. A vertical sliding window is installed in this door.
- Dorsal fin has been added.

▶ **Performance**—"We have gained unbelievably more takeoff and climb performance in the conversion due to changes in the airfoil design of the fuselage," Wardlow asserts.

He lists the following weights and performance figures: wheels, empty 3,200 lb., gross 4,650 lb.; floats, empty 3,550 lb., gross 5,200 lb.

Stall with flaps is 55 mph., without flaps 60 mph. Cruise speed is 150 mph. at 7,000 ft.

New flooring has been installed using compounded fibre glass material in place of plywood. The entire cabin area has been soundproofed. An outside baggage door is provided aft of the hammock seat area.

Many other changes to modernize the aircraft also are reported. Price quoted is $14,990 FAF.

Aircraft Propeller Shipments Drop 6%

Shipments of aircraft propellers and parts during the first six months of 1954 totaled $83.9 million, a drop of 6% for the same period last year and a loss of 15% for shipments in the last six months of 1954, Commerce Department reports.

U.S. military customers received shipments amounting to $74.8 million, 6% below the value shipped from January through June 1953. Shipments of propellers and parts for civilian aircraft during the current period were valued at $9.1 million, 7% below shipments during the last half of 1953.

Number of propellers for civilian aircraft shipped during the first half of 1954 amounted to 4,755 units, compared with 5,217 for the first half of 1953. Number of propellers shipped to the military was not disclosed.

Subcontractors to Get Support From AMC

About 200 large prime Air Force contracts from 24 states will attend a one-day meeting in Chicago Sept. 28 to discuss participation of small business in subcontracting.

The session has been called by Maj. Gen. W. O. Senter, commanding officer of the Oklahoma City Air Materiel Area. It will be held at the La Salle Hotel.

In addition to the Oklahoma City AMA, contracting representatives will be present from the San Antonio and Mobile Air Materiel areas. Speakers will include Maj. Gen. David H. Baker, Air Materiel Command director of procurement; Kennar Weddell, chief of the Office of Small Business at USAF Headquarters, and M. L. Johnson, executive for small business of AMC.

AMC spokesmen emphasizes that invitations to the meeting were given mainly to large prime contractors. There is some apprehension that major AMC suppliers, faced with some curtailment of orders in the future, may tend to cut down on the amount of subcontracting given to small business.

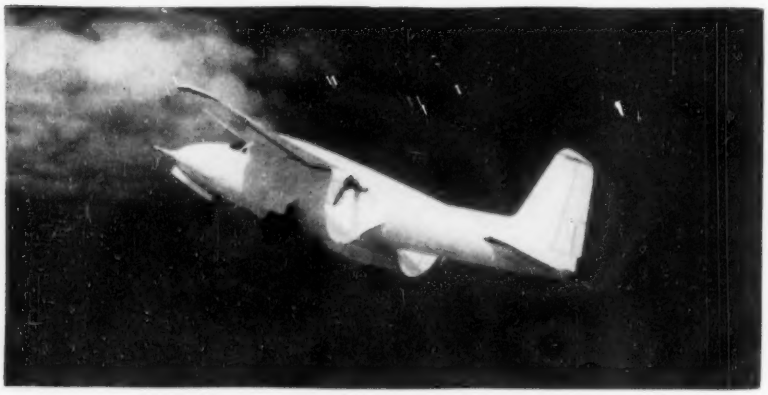
USAF, faced with congressional complaints when small firms lose business and equally concerned about keeping certain defense plant operations active so that they can meet possible mobilization demands, will continue the campaign at a New York meeting next fall.

"We fear there may be a tendency to pull back subcontracting into the prime contractor's home plant," an AMC spokesman says, "and we want to avoid that wherever possible. The purpose of these meetings is very simple. It is to encourage the utilization of facilities owned by small concerns."

Gen. Metzger Resigns

Maj. Gen. Kern D. Metzger, chief of the Industrial Resources Division of Air Materiel Command's Directorate of Procurement and Production, is resigning Sept. 8. He will return to private business in Cleveland, Ohio.

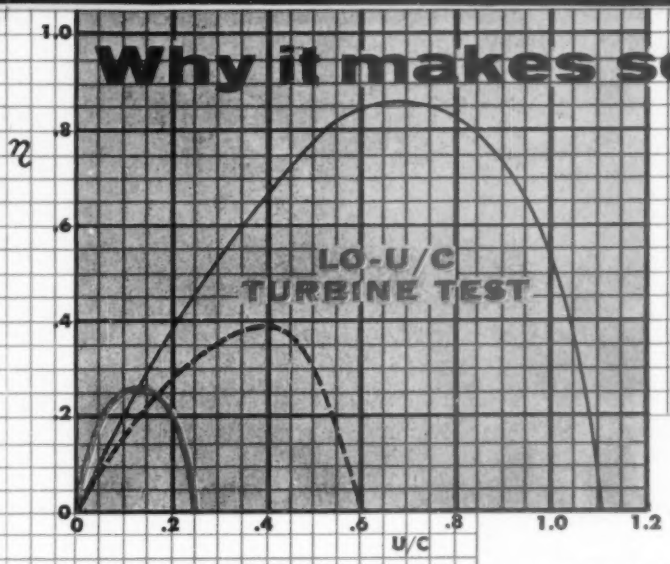
Gen. Metzger was a key mover in the development of an aggressive government-sponsored program to expand production of titanium for aircraft.



Channel Wing Plane in Flight

Custer Channel Wing Corp.'s CCW-5 is shown during a recent flight test at Oxnard (Calif.) Airport. Pilot W. J. Davidson said the airspeed indicator "showed only 11 mph." during the flight. Custer earlier claimed the CCW-5 climbed at 3,000 fpm.

Why it makes sense to use this TURBINE-DRIVEN FUEL PUMP



Every Fuel Systems Designer should know about these recent developments at Hydro-Aire

Hydro-Aire's new LO-U/C Turbine is named for its remarkable low speed/high pressure characteristics. This curve shows you why. Even more important: the LO-U/C Turbine is inherently self-regulating—requires none of the usual complex controls.

An earlier Hydro-Aire development was the HY-V/L Fuel Pump, which operates on the unique principle of compressing fuel vapors back into liquid *inside the pump*. Because it eliminates the old vapor separator this fuel pump offers far greater operating efficiency.

The combination of these two units results in a brand-new Turbine-driven Fuel Pump that you—the Fuel Systems Designer—should know about. The advantages are clear. First, it is not subject to secondary (electrical system) failure, and therefore has greater reliability. Second, it is lighter than a motor-driven pump. Third, it does not place additional load on the electrical system.

If bleed air is available in your pump application, please consider these advantages. If not, please remember that Hydro-Aire's motor-driven HY-V/L Pumps offer many advantages in this category as well.

Either way, we suggest you give us the opportunity to discuss your fuel pump problems. We know you'll be glad you did.

HYDRO-AIRE *Inc.*
3000 WINONA AVENUE, BURBANK, CALIF.
The Aviation Subsidiary of CRANE *Co.*

EVERY FIGHTER, EVERY BOMBER, EVERY TRANSPORT IS HYDRO-AIRE EQUIPPED

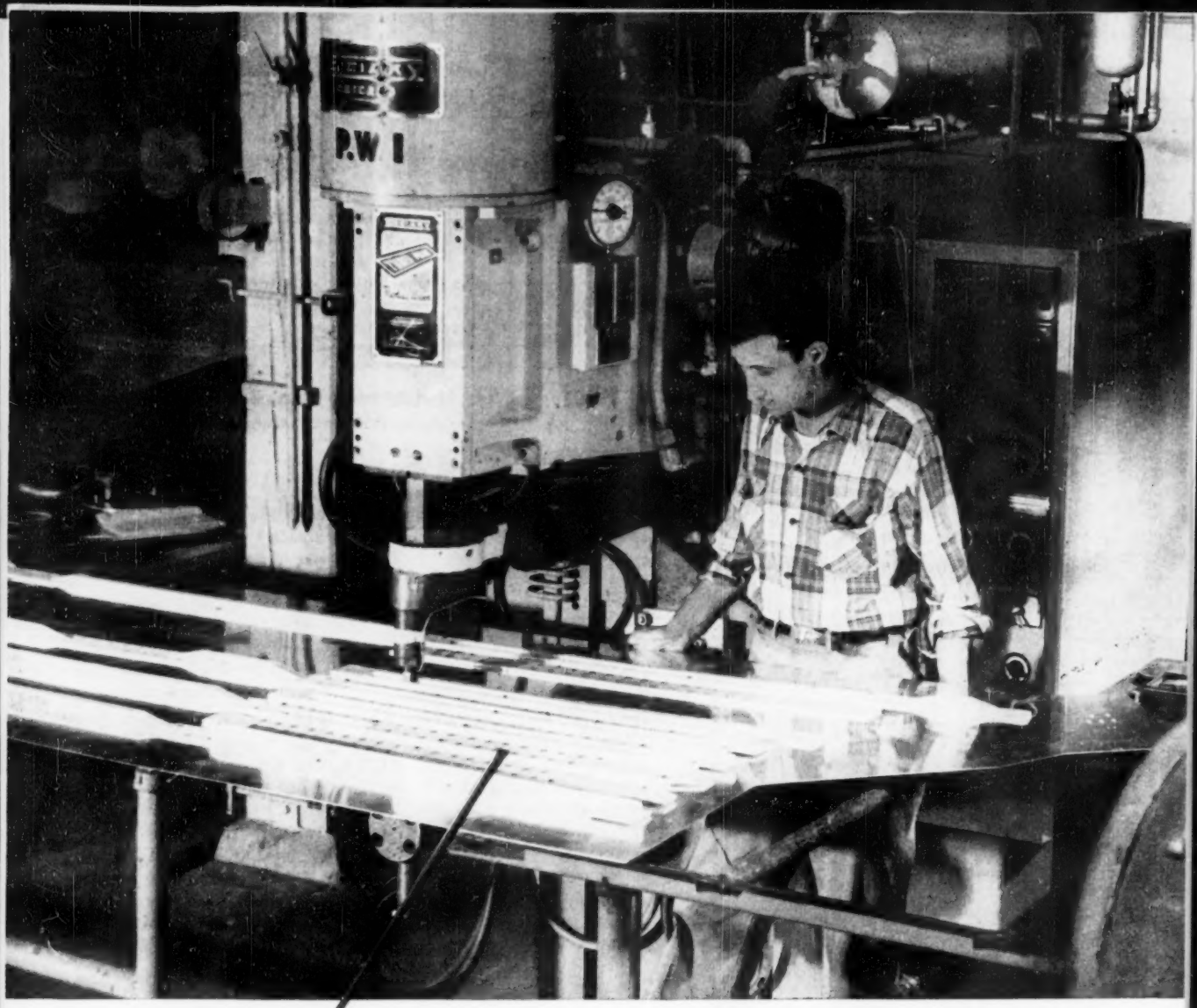
Transistors Loom in Avionics Future

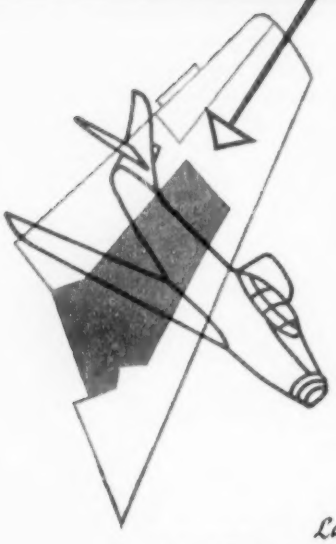
▶ **How Soon?** Will the transistor replace the vacuum tube in future aircraft? What new avionics developments will come from transistor applications? These and many other questions are being answered in the laboratories of Hydro-Aire's Electronics Division, Burbank, California.

▶ **First in the West**—A licensee of Western Electric Co. in the transistor field, Hydro-Aire, Inc. is the first company on the West Coast to make transistors available to industry, and one of the pioneers in transistor applications for aviation.

▶ **Consulting Service**—The firm has developed a complete line of germanium transistors and diodes manufactured to stringent aviation quality control practices. Research continues, while Hydro-Aire has also set up a staff of consulting engineers to help other electronics manufacturers solve the complicated circuitry problems of new product applications.

▶ "The transistor has opened up entirely new vistas in electronics," states H. H. Rhodes, President. "Hydro-Aire intends to play its role in this new field."





Spotwelding .240 75st Aluminum Stringers to .081 75st Clad in Wing Section on F-84-F

These heavy section stringers are a Republic design improvement in wing structure of the battle proven F-84-F Thunderjet. This instance of improved design with resistance welding is not unusual — Republic design engineers are specifying five times more resistance welding in wing assemblies and three times more in fuselage assemblies than ever before.

The advantages of resistance welding in both airframe and jet engine fabrication are well known, Aircraft and Military specifications are most easily satisfied and maintained by Sciaky patented Three-Phase welders. That's why approximately 90% of all the resistance welding in airframe fabrication is done on Sciaky machines. Write for Bulletin 134ST for information on Sciaky Type ST aircraft welders.

The Sciaky Type ST welder shown above is one of many at Republic proving in daily production Sciaky's basic thinking of machine design to do *more useful work* at *lowest operating cost* with *maximum reliability*.

Largest Manufacturers of Electric Resistance Welding Machines in the World

SCIAKY

4935 West 67th Street, Chicago 38, Illinois

AIRFREIGHT PROBLEMS are thrashed out in down-to-earth fashion at informal staff meeting attended by Flying Tiger-Slick officials.

How FTL Breaks Airfreight Bottlenecks

By William J. Coughlin

Burbank, Calif.—Survival of the fittest, in the transcontinental airfreight competition, rapidly is becoming survival of the fastest.

The major passenger airlines—American, United and Trans World—have been taking a bigger and bigger bite out of the airfreight market.

To meet this increasing competition from the scheduled airlines, the nation's largest air carrier devoted solely to freight, Flying Tiger-Slick Airlines, now operates a fleet of three Douglas DC-6A Air Freighters on transcontinental schedules. Two more will be added to the fleet soon.

▶ **Shifting Pattern**—In the past, one of the big advantages of the cargo carriers has been the ability to go where and when needed. With no passengers to fret about on-time departures, the airfreight lines often could delay takeoffs to meet last-minute requirements of their customers.

The pattern, particularly for the transcontinental operation, is shifting. There is more and more emphasis upon on-time arrivals.

Each morning at Burbank a line of trucks awaits the arrival of the Flying Tiger-Slick blue ribbon DC-6A flight from the East, the "Day Breaker."

These trucks shuttle the incoming freight swiftly across the Los Angeles area, often delivering before noon parcels that were loaded in New York the night before.

On-time arrival of the big DC-6 is important to these freight forwarders. One of the largest Tiger contracts, in fact, was obtained because the company quoted an arrival time 35 minutes ahead of its major passenger line competitor.

▶ **Next-Day Service**—Flying Tiger-Slick, therefore, finds itself shifting more toward a scheduled operation, away from its early advantage of being able to hold flights for late shipments.

"We have to give next-day service now," says president Robert Prescott. "The day of second-day delivery in this business is gone forever."

The airfreight line now is in the transition stage of adapting itself to the scheduled operation of its transcontinental DC-6s. Its numerous supporting C-46 flights must be matched to this pattern, like pieces into a jigsaw puzzle. Too many flights arriving at the same station at once means unloading delays, can slow down the schedules. Holding a takeoff for one shipper can mean a dozen more are made unhappy.

▶ **Heavy Strain**—The transition has not been an easy one. Together with the problems created by continuing efforts to merge the two airfreight lines (AVIATION WEEK Aug. 23, p. 58), it has been a rugged test of the ability of Flying Tiger-Slick management to adapt itself to new conditions.

With American, United and TWA lifting a bigger portion of the airfreight market, revenues of Flying Tiger-Slick have not been as high as anticipated.

The strike of AA pilots also was a mixed blessing. It meant a big jump in cargo for Flying Tiger-Slick. But the emergency put a heavy strain on the system before the "bugs" were worked out and it could adjust to the load.

The airfreight line could not overextend itself in handling the extra business because much of it would prove to be temporary; at the same time, it wanted the service to be as good as possible in the hope of luring some of American's customers away permanently.

▶ **Inherent Advantage**—But despite these problems, Flying Tiger-Slick retains an inherent advantage. It is an all-cargo operation and can—with proper management—gear itself to freight schedules of such speed and efficiency that the passenger lines will be hard pressed to offer comparable service.

But to provide that type of management requires constant attention to even the smallest detail that could delay delivery of the company's airfreight

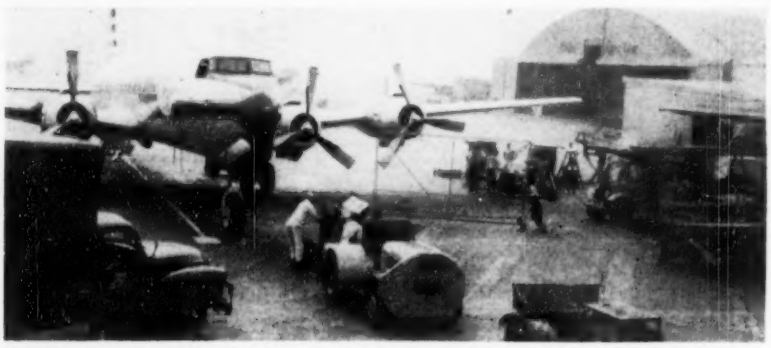
Top-Level Meeting

Not many companies let the press sit in on their top-level staff meetings, particularly when the meetings deal with such delicate subjects as customer relations and fouled-up operations.

But Flying Tiger-Slick Airlines is one of those that does. Aviation Week's West Coast Editor recently spent a morning listening to the top officials of the nation's largest airfreight line throw brickbats at each other and at their customers as they attempted to work out some of their problems. His report on the unusual session is included in the accompanying article.

TRUCKS AND GROUND CREWS keep on-line alert awaiting arrival of Day Breaker.

LINEMAN GUIDES Day Breaker cargo DC-6A Liftmaster freighter to unloading point.



CREWS MOVE IN quickly, making every minute count. Screen is wheeled in front of props.

even for a few minutes.

So four mornings a week, the top executives of Flying Tiger-Slick sit down around a table in a paneled conference room on the second floor of the firm's headquarters in Burbank.

In a rough-and-tumble staff meeting in which almost no excuse for a delay is accepted without strong argument, the company's officers analyze the flight operations of the previous day.

Such meetings are not unique in the airline industry. Few are in such earnest, however. Tempers flare; bitter words are exchanged. But at the end of each shirt-sleeved session, a few more "bugs" may have been worked out of the system, a firmer policy hammered out.

► **Rough Education**—Sit in on one of these daily meetings and you get a rough education in the airfreight business. You get it from a company where a man still can talk back to the boss, where he can threaten to quit if the boss does not like it, and then go out to lunch and a martini with him after the argument is over. You can watch policy being formed—policy that will mean better service for the customer, more revenue for the company.

You can see management at work with its coat off in a business that still lies mostly in the future, despite 10 years of the hardest kind of labor and despite the fact that last year's total airfreight volume was about 300 million ton-miles.

This is expected to reach a billion ton-miles by 1960, and Flying Tiger-Slick is grabbing for the major share of it. The meetings may be a little rougher than those of the board of directors of U. S. Steel, but so is the business.

On a recent morning, the staff meeting lasted for two hours, covering two DC-6A flights and 15 C-46 flights of the night before.

► **On the Spot**—President Prescott was on hand. So were Thomas L. Grace, executive vice president, and George Cussen, vice president-sales. William E. Bartling, vice president-transportation, was there with his assistant, Edward L. Morgan. Director of Ground Operations Frank Lynott was present.

Also in the room but called on to say very little at this particular session were H. P. Huff, vice president-engineering and maintenance; W. J. Duehren, superintendent of maintenance, and Joe Baker, general foreman of shops. None of the delays of the night before were attributed to maintenance. Next time might be their turn.

This time Bartling was the one on the spot. The meeting went like this: Bartling opened the session by sketching the flights of the previous day and night on the blackboard extending down one wall of the room. The varicolored chalk left a spider-web of routes.

As Morgan read off the weights and departure times, Bartling noted these on the board also.

"Why was the Day Breaker so late out of Newark?" Prescott immediately wanted to know. Bartling explained that the flight had waited for a large shipment from a forwarder, which will be identified here only as "Transcontinental."

Bartling: "We waited an hour and 20 min. for the Transcontinental truck."

Prescott: "Do we want to keep waiting for this guy?"

Grace: "He's changing over in his accounting system; that's why he's late."

Lynott: "We've given him a week to solve his problem."

Prescott: "If we keep waiting for him, we're going to lose our other customers."

Lynott: "Give him a week."

Prescott: "But how long will we hold the flight for him? Midnight?"

Bartling: "How about 2300 (11 p.m.)?"

Prescott: "Suppose he calls up and says he won't be there until after midnight?"

Cussen: "Transcontinental was a good friend. He stuck by us when things were thin. I can remember the day when Transcontinental was the only one on there."

Prescott: "He will be again if his competitors find out they are late because of Transcontinental."

Cussen: "He's got a mechanical problem—let's give him a chance."

Prescott: "But how late?"

Cussen: "2330."

Prescott: "That gets us here when?"

Bartling: "9:30 a.m."

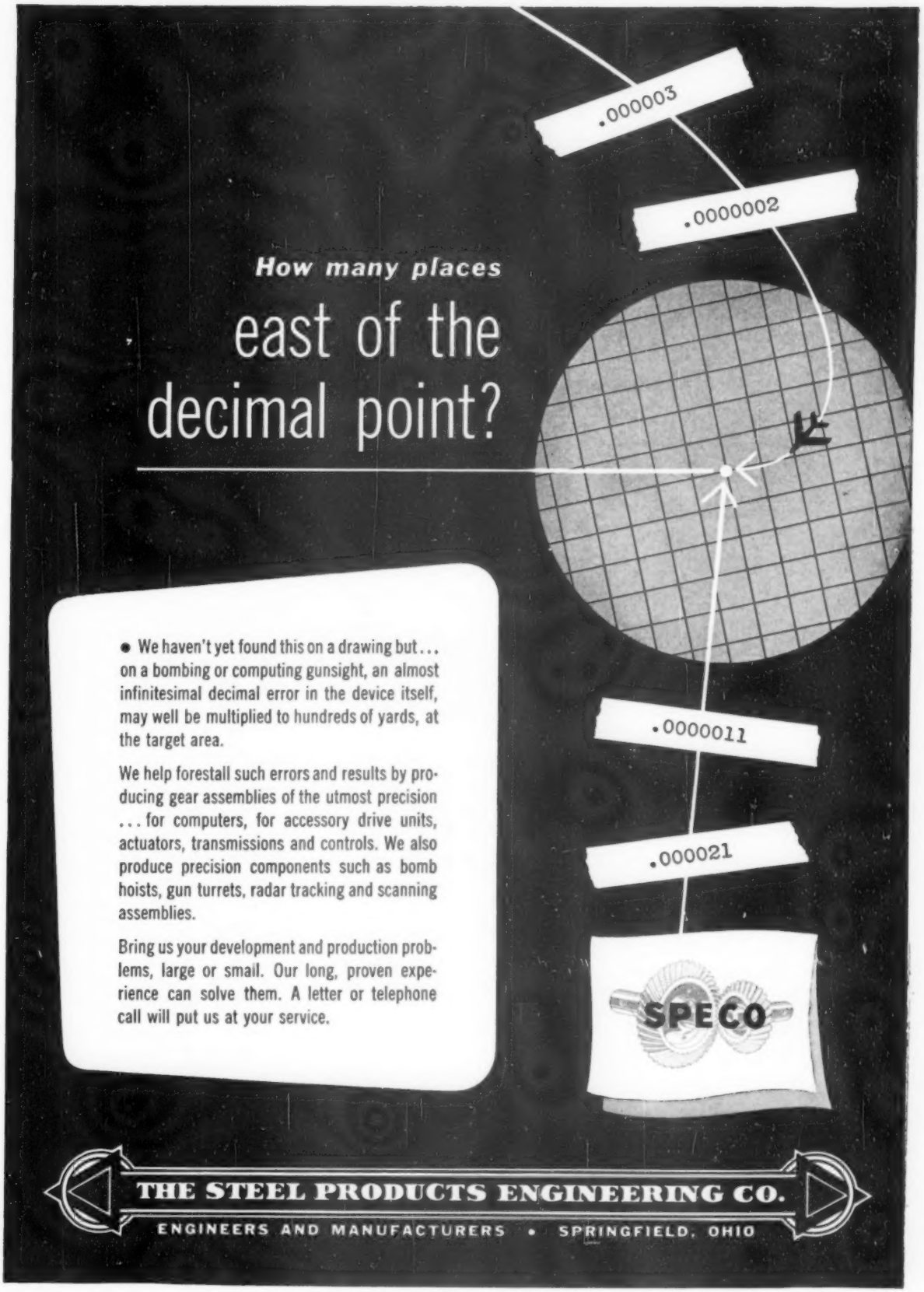
Grace: "I'll call him."

Bartling: "Give him a week. After that, we leave at 2200 with what freight he's got out there."

The discussion shifted then to a 25-min. delay at Chicago. Bartling explained that the delay was due to a search for some Chicago-bound cargo that had been loaded at Newark.

Prescott: "Hell, can't we load that stuff where we can find it?"

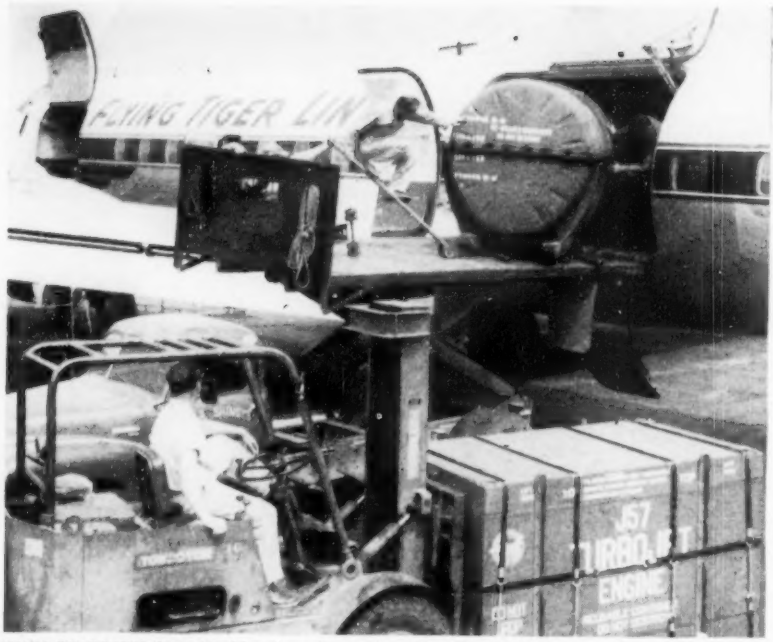
Lynott: "We can't segregate the



• We haven't yet found this on a drawing but... on a bombing or computing gunsight, an almost infinitesimal decimal error in the device itself, may well be multiplied to hundreds of yards, at the target area.

We help forestall such errors and results by producing gear assemblies of the utmost precision ... for computers, for accessory drive units, actuators, transmissions and controls. We also produce precision components such as bomb hoists, gun turrets, radar tracking and scanning assemblies.

Bring us your development and production problems, large or small. Our long, proven experience can solve them. A letter or telephone call will put us at your service.



HIGH-PRIORITY CARGO, like these jet engines, is unloaded by fast-moving ground crews.

Chicago offload, partly because of the Transcontinental problem. We have to keep space open."

Prescott: "They spent close to an hour looking, not 25 min. They looked while they were gassing the plane. What are they doing, playing Easter egg with it?"

Lynott: "No. Newark says it was loaded in a separate compartment. Chicago says it wasn't. That's all I've been able to find out so far."

Prescott: "How about some big stickers to identify it?"

Bartling: "When Transcontinental comes along late, they have to throw that on top of the Newark-Chicago load."

Prescott: "Then how about netting it?"

Lynott: "We do."

Prescott: "Somebody forget to net it last night?"

Lynott: "No, I'll have to explain in detail how the plane is loaded." (He explained).

Prescott: "Why can't they teletype in detail where it is?"

Lynott: "They do."

Prescott: "And they still can't find it?"

Bartling again explained the loading problem, drawing three sketches of the plane on the board while doing it. This called attention again to the late California-bound Transcontinental cargo, loaded on top of the Chicago-bound packages.

"There just aren't enough doors ... to put everything on last," Lynott complained.

The meeting then turned to the eastbound Day Breaker flight of the night before, which had been scheduled to depart at 11 p.m. and took off at 4 a.m.

"We nearly had a strike in maintenance trying to get it out of the shop in time, they got it out at 11 p.m., and then we didn't leave until 4 a.m.," Prescott said. "What happened?"

Bartling explained that the flight had been delayed to await the arrival of a C-46 from San Francisco with 13,000 lb. of freight for the DC-6. The C-46, delayed at San Francisco because ground crews were unloading another C-46, was two hours late.

Grace: "What happened after it got here?"

Bartling: "It didn't get here until 2:15 a.m."

Grace: "Couldn't we have sent the '6 out without it?"

Prescott: "How long will you hold the DC-6 flight?"

Bartling: "The latest will be 2:30 or 3."

Prescott: "But what is the latest?"

Bartling: "I'd say 3:30."

Prescott: "But this time you held it until 4:30."

Bartling: "But there were other delays here. The door stuck. Then there was the transloading."

Prescott: "You figure that in. Transloading is a built-in delay. What is the latest you can leave here and get to Newark in time to turn around and get out on schedule?"

Bartling: "2:30."

Prescott (to Cussen): "Don't you think, George, it's better to leave some freight here and make one shipper unhappy than hold up the whole Day Breaker schedule? We're fouling up the whole scheduling this way."

Bartling: "But this was 13,000 lb.!"

Grace: "Wait a minute, wait a minute! Why not bring down that C-46 from Frisco at 8 o'clock?"

Bartling: "We'd have left 4,600 lb. in S. F. last night if we had."

Prescott: "I don't know what's the matter with busting an early '46 out of S. F. down here."

Bartling: "If we'd done that last night, we'd have ended up with freight left in S. F. and we'll have to bring it down blind. To get here for the 2300 Day Breaker departure, we allow two hours for transloading; he'll have to be here by 2100, which means leaving there at 1900, which means alerting the crew at 5 p.m."

Prescott: "Can't we have a crew stand by?"

Bartling: "Yes, but it'll be blind. We don't know that early what we'll have."

Prescott: "If you had last night to do over, would you do it the same?"

Bartling: "Well, yes."

Prescott: "What I'm trying to find out is how to cure it."

Bartling: "We all are."

Prescott: "Another operation like this today and we won't have any westbound freight."

Bartling: "I understand full well we can't do that again. But once you've made the decision you can't back out. If you back out, it's screwed up more than ever."

Prescott: "But we've got to get out of here by 2:30 or be late arriving in the East."

Bartling: "We'll have to find another way of doing it then."

The discussion shifted to an eastbound delay at Chicago and then came back to the late Burbank takeoff.

Prescott: "If that plane leaves here at 4:30, you know damn well you're loused up for Newark takeoff."

Bartling: "Sometimes you have to take your beating."

Prescott: "Newark is not the place to take it."

Bartling: "Yes, but if you have to take a beating, take it early or you're taking it for the whole week."

Prescott: "Do you agree that if we have another of these within 60 to 90 days, we may lose 12,000 to 14,000 lb. of freight permanently?"

Bartling: "I don't know how much we'll lose, Bob. But sometimes we have to gamble in this business."

Prescott: "But you're going to make us lose business."

Bartling: "I don't want to do that. If I'm going to make you lose business, you better get somebody else!"

Prescott: "Listen, Bart, when you're running late on Burbank-Newark, do

you have to wait for the Frisco freight?"

Leynott: "You mean send the Frisco '46 East? It would cost you a '46 back."

Prescott: "What I'm looking for is a way to get that '6 out on time."

Grace: "What we have to do to get on-time departure from Newark is kick it out of here by 2:30. The guys were justified in that decision last night. What we have to do is set a policy."

Prescott: "Okay, then let's set a policy that we get out of here by 2:30. Let's try it and see. From now on, if we have a departure out of here after 2:30, there will be no excuse except maintenance. Let's put it this way: Without maintenance delay, a DC-6 damn well better be in New York by 7 p.m."

Bartling: "Okay."

After a discussion of the C-46 flights of the previous night, the meeting adjourned for lunch. Flying Tiger-Slick policy was just a little firmer than it had been the night before.

New RAAF Estimates Provide $125 Million

(McGraw-Hill World News)

Melbourne—The Royal Australian Air Force's latest budget estimates call for about $125 million during the new fiscal year, compared with $60 million for 1953-54. The new figure is higher than the Navy's $100 million, lower than Army's $160 million.

The RAAF last year spent little for new aircraft. More than half went on personnel and building; construction and maintenance took an additional $12 million.

What money was left for planes was not allocated entirely, informed sources report.

Immediate flying equipment needs must be met by the British and the U. S., because the Australian aircraft industry is not counted on except during a crisis.

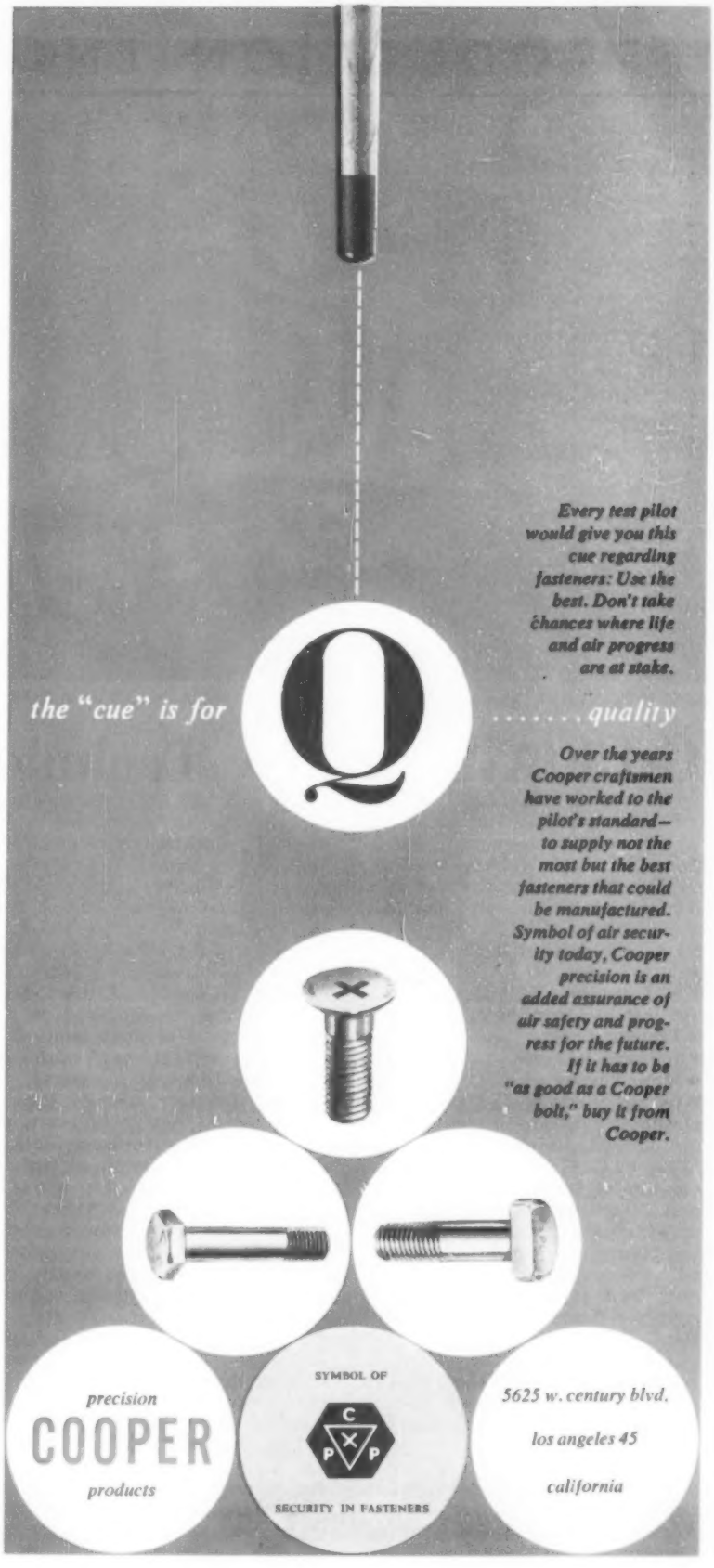
RAAF has only a handful of Canberra jet bombers and Sabre fighters, with the rest of its equipment made up mostly of World War 2 types.

New ARDC Officers

Air Research and Development Command has announced appointment of two new executive officers:

• **Col. Joshua T. Winstead, Jr.,** former chief, Plans and Programs Division, Deputy Chief of Staff for Personnel, Headquarters, USAF, has been assigned to headquarters, ARDC, as executive officer.

• **Col. D. W. Roberts,** former chief, Facilities Division, has been appointed executive officer for the Deputy Commander for Technical Operations, ARDC.


the "cue" is for
Q
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Every test pilot would give you this cue regarding fasteners: Use the best. Don't take chances where life and air progress are at stake.
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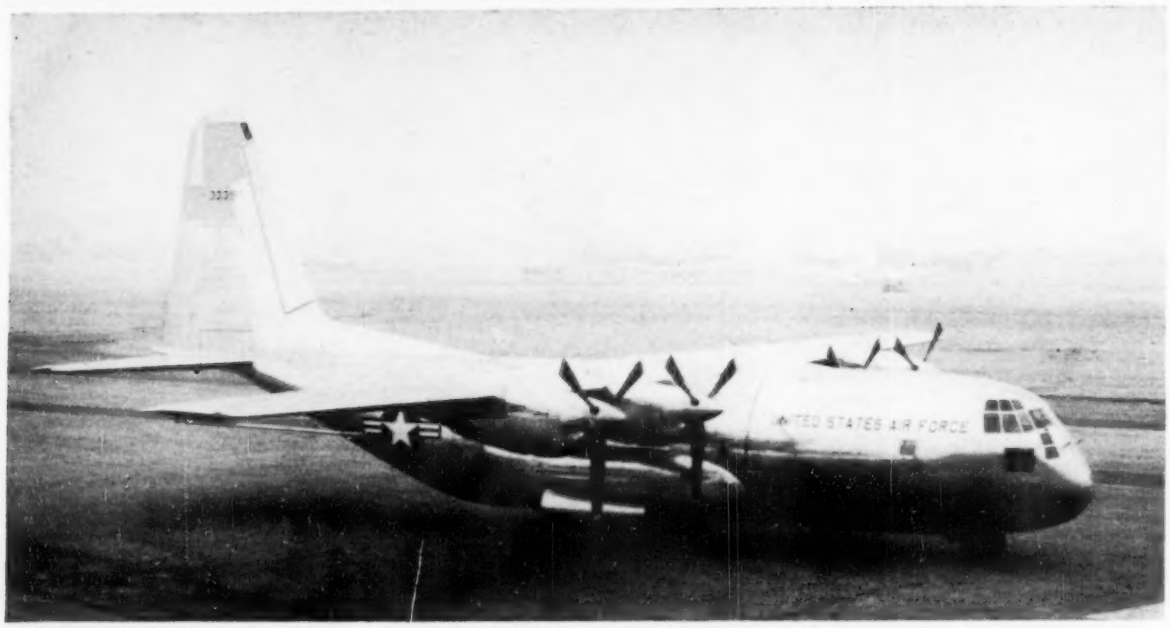


LOCKHEED YC-130 transport, forerunner of production C-130A, made its first flight Aug. 23. Powerplants are four Allison T56s.

C-130A Uses New Techniques Widely

First production details on Lockheed Aircraft's turboprop-powered four-engine transport—the C-130A—reveal that the plane makes extensive use of newer developments in aircraft fabrication. These include:

- **Integrally stiffened sheet.**
- **Large forgings.**
- **High-strength A78ST aluminum alloy and high-heat-treat steel.**
- **Titanium parts.**
- **Solid-film lubricant.**
- **Metal bonding.**

▶ **Integral Stiffening**—Data on the manufacturing methods and materials for the C-130A, supplied to AVIATION WEEK by C. F. Marschner, production engineer at Lockheed's Georgia division, where the plane is being produced, disclose that this new military cargo carrier makes greater use of integrally stiffened skin than any other aircraft built to date. About 120 integrally stiffened components go into the C-130A.

This type of structure follows the pattern initiated by Lockheed with use of machined and extruded integrally stiffened skin on the company's Constellation and F-94 series.

Integrally stiffened sheet on the C-130 is made in three different ways, depending on its location in the plane.

- Some sheet is machined from plate because the configuration or size will not permit the use of extrusions.
- Some is machined from extrusions, primarily to decrease web thickness. Some of these parts are used externally; machining provides the smooth contour required. Where machined extrusions are used, virtually all requirements are obtained from Aluminum Company of America's Lafayette, Ind., plant.
- Another form of sheet comes from extrusions without any machining. Only edge trimming is required. As-extruded integrally stiffened sheet is used internally because flatness is not yet adequate for aerodynamic contours, Lockheed says. Almost all material used in the as-extruded condition is obtained from Reynolds Metals Co.'s Phoenix plant and is currently being flattened at Lockheed's Georgia division. The company plans to have Reynolds perform the flattening operation for further production.

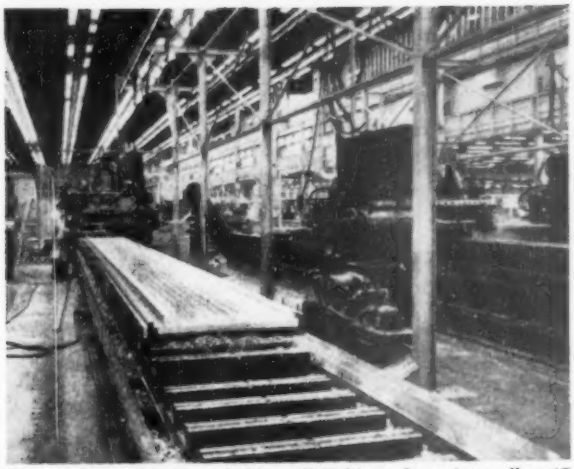
▶ **Sheet Applications**—Upper and lower interbeam skins for the entire outer wing are made from plate stock which has been machined (mostly on Onsrud skin mill) to provide integral stiffeners. Results are substantial weight saving and improved structural efficiency. Riveted seams and material overlap have been eliminated; tank sealing difficulties are avoided where the wing is used for fuel storage. Largest of these integrally stiffened wing panels is 48 ft. long; most are about 2 ft. wide.

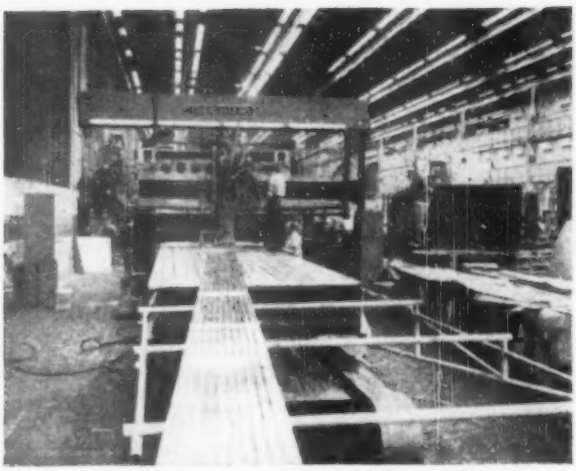
Floor of the cargo area is made up of a series of integrally stiffened extrusions. This not only saves weight, but reduces the number of joints and seams which entrap dirt and cleaning compounds used in washing down the cargo area.

As-extruded integrally stiffened sheet is used as webs for floor support bulkheads, pressure seal between the pressurized fuselage and wheel fairings, and wing rib webs.

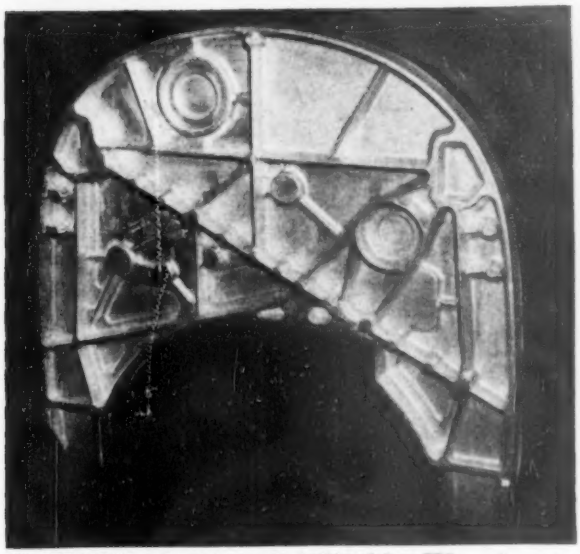
▶ **Large Forgings**—About 25 aluminum alloy forgings which fall into the large-size category are being used in the C-130A. Most of these are multiple-use items (employed in more than one place on the plane), resulting from careful attention to detail design and die cost considerations. The C-130 design practices with forgings follow those used by the company's California division on combat-type aircraft.

Most of the forgings scheduled for the C-130A are producible on existing 16,500-ton presses operated by Alcoa and Bridgeport Brass and the 18,000-ton press operated by Wyman-Gordon. However, a number of these large forgings will be made on new Heavy Press Program machines which will begin operations next year. Thinner webs should be one of the benefits resulting.





BIG MACHINES—Onsrud skin mill (left) produces integrally stiffened wing interbeam skin; then Giddings and Lewis mill cuts taper.



BIG FORGING—C-130A nacelle bulkhead has 775 sq. in. area.

METAL BONDING is used in liferaft compartment door.

As experience develops with these new giant presses, other very large forgings will be adapted to the C-130A design, which has been planned to permit production changeover to incorporate these larger parts.

► **High-Strength Alloys**—The C-130A is believed to be the first plane which has made extensive use of Alcoa's A78ST—an aluminum alloy approximately 7% stronger than the widely used high-strength 75ST.

There are about two hundred and ten A78ST parts used in the design, primarily in extrusion and plate stock applications, since these permit best utilization of the alloy's higher strength. The material is used in many of the wing skins and in floor beams.

A substantial number of high-heat-treat steel parts in the 260,000 to 280,000-psi. strength range have been incorporated in the C-130A design. Considered a pioneering application, use of this high-heat-treat steel provides savings in weight and space.

Lockheed has developed manufacturing methods for the production of these parts.

► **Titanium Parts**—Approximately 500 individual sheet metal titanium parts, for a total weight of 300 lb., are used in the plane. This commercially pure material is employed in areas where heat- and corrosion-resistance are factors, and has afforded considerable weight saving compared to the stainless steel which it replaces. Examples of use include the turboprop nacelles and the wing trailing edge just aft of the nacelle.

Applications have been made on a "sure-fire" design basis to avoid fabrication and service problems. As properties and characteristics of titanium alloys become better known and it becomes feasible to use these materials on a more economical basis, it is said, more extensive use of the metal will be made.

► **Solid-Film Lubricant**—About 50 parts and assemblies have been treated with solid-film lubricant to reduce wear caused by chafing action and intermittent operation. This method of lubrication—a solid-film anti-frictional material is baked onto the parts—is expected to reduce service and maintenance problems in the new transport significantly.

Applications include piano-hinge joints, landing gear trunnions and wing leading edge joints. In the latter application, the solid-film lubricant is used to counteract the effects of wing flexing at several points along the span at adjoining skin sections.

The film is a Lockheed-developed material marketed as Lubrifilm 4396, under a license agreement, by Electrofilm Corp., North Hollywood, Calif.

► **Metal Bonding**—Metal-to-metal adhe-

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ACCURACY—TEMPCAL Tester temperature readings are made on a highly accurate potentiometer; guaranteed accuracy is ±5°F with temperatures ranging from 0° to 800°F. Heater probes used for cylinder head thermocouples are guaranteed accurate to ±4°C at 0° to 300°C operating temperatures.

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sive bonding is used on light-gage semi-structural parts. Approximately 100 separate assemblies incorporate this method of joining, resulting in reduced structural weight and improved fatigue resistance, particularly in areas subjected to vibration.

Applications include wing and tail trailing edge assemblies and doublers on skin in the tail box beam where extra thickness is required for machine countersinking of rivets.

The adhesive now being used is Metlbond, manufactured by Narmco Resins & Coatings Co., Costa Mesa, Calif. Another adhesive under consideration is Scotchweld, a product of Minnesota Mining & Mfg. Co., St. Paul, Minn.

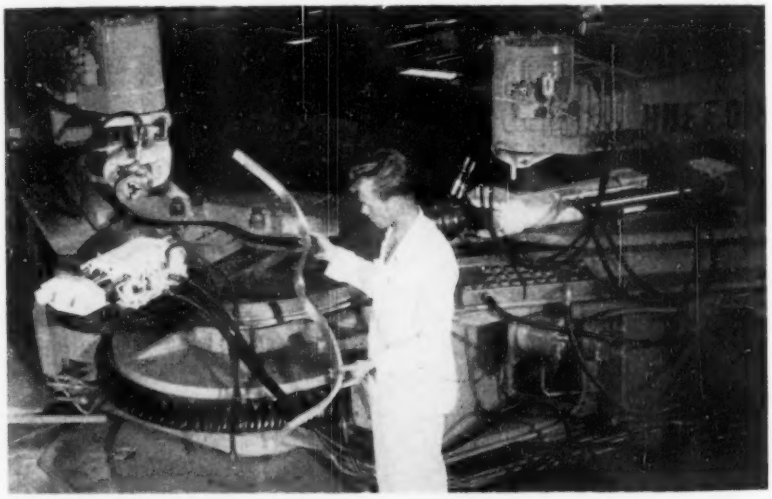
—Irving Stone

Silicone-Coated Cloth Seals B-47 Aileron

A silicone-coated cloth for the Boeing B-47 Stratojet aileron flap seal has been developed by Minnesota Mining & Manufacturing Co.'s Irvington Varnish & Insulator Division.

According to Irvington engineers, the new cloth—Irv-O-lon—will last from 3 to 10 times longer than the material it replaces, will not peel at high speeds.

For aircraft application, General Electric's SE-76 silicone gum was compounded and applied to orlon cloth at Irvington and the material cut, sewed and provided with a zipper for installation on the bomber's aileron assembly.



MAKING REVERSE BEND—Male form block on Hufford forces part into center portion of die; arms then wrap in opposite directions, completing the contour.

Stretch-Wrapper Rotates 360 Deg.

A versatile stretch-wrap forming machine with full 360-deg. arm rotation has been designed by Hufford Machine Works, Inc. in conjunction with Douglas Aircraft Co.'s El Segundo Division to expedite the formation of parts now requiring several types of machines.

In addition to producing conventional parts from extrusions and sheet up to 22 in. wide, the new unit is reported to be capable of turning out many parts previously impossible with a single machine.

▶ **Jobs Performed**—Designated the Carousel model, because the operator rides either arm, the unit forms full circles with complete arm rotation around a stationary die and table.

The stretch-wrap forming can be complemented with a following roller or wiper operating simultaneously. Attached to one of the rotating arms, the roller may be operated in either direction of rotation, is unlimited in the number of passes which can be applied to the work.

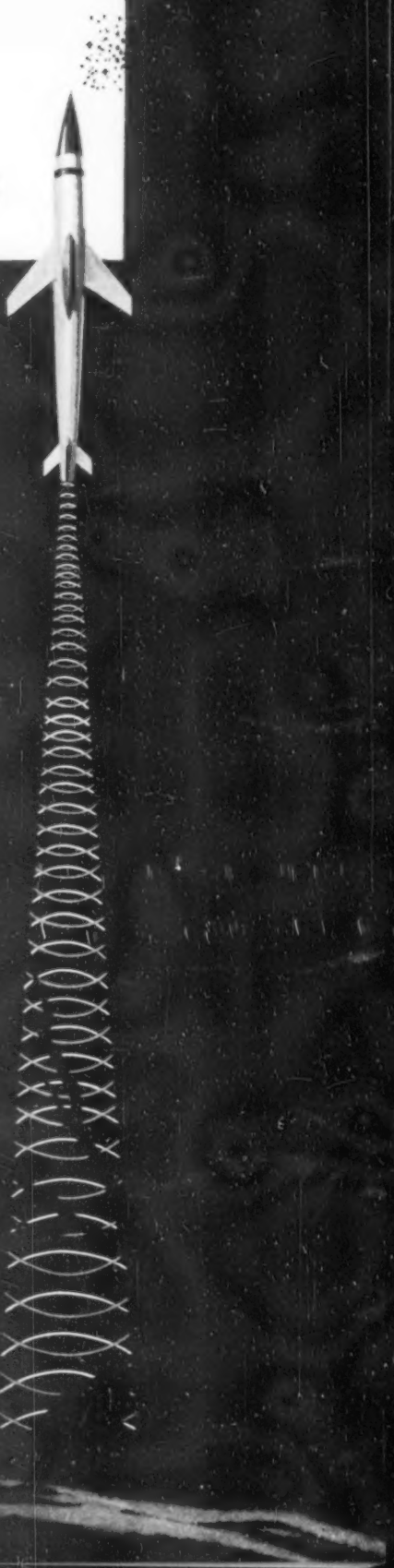
Other jobs the machine will perform include reverse bends and S-curves, stretch-straightening, joggling and bulldozing.

▶ **Third Cylinder**—Another feature is a third tension cylinder whose base is bolted to the stationary table at any desired extension. Free-swiveling horizontally, the cylinder may be used to grip one end of the work while utilizing one rotating arm for the other end, thus allowing simultaneous tension at both ends of the workpiece. The remaining rotating arm thus is released for other operations, such as rolling.

The stationary cylinder can be used opposite a joggle position to apply pressure or bulldoze a two-piece die such as is frequently used to form some reverse bends. Rotating arms pass around the stationary cylinder with no restriction to their 360-deg. travel.

EXPERIENCE

Launching Point for Missile Development



Ever since 1946, when the Navy flew this nation's first surface-to-air guided missile, Fairchild has been contributing to the advancement of missile design and development. Fairchild built that precedent-breaking missile.

The experience gained has been broadened incalculably by the variety of missiles produced for *all* the Armed Services.

Today at Fairchild an integrated engineering team — adept in electronics, air frame structure and aerodynamics, propulsion and in the design of missile ground equipment — is applying the specialized knowledge that only years of experience can bring to a number of current missile projects.

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Speed Control Division, Wickliffe, Ohio • Stratos Division, Bay Shore, N. Y.
American Helicopter Division, Manhattan Beach, Calif.

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PLANTS. *In San Diego (Photo above) and Des Moines. A total of 1,400,900 sq. ft. floor space. Approximately 5,000 employees. Annual sales over $65,000,000.*

EQUIPMENT. *Production equipment for alloy and super metal fabrication—forming, machining, welding, brazing, casting, coating. Extensive laboratory and testing equipment. Facilities for development, prototype, limited or mass production.*

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Ceramic Coatings. *"Solaramic"® is the Solar trade mark for a family of coatings that protects metals from heat, corrosion, galling and abrasion.*

Controls. *Complete control systems utilizing the new Solar "Microjet"® principle for control of gas turbines, jet engines and pneumatic devices.*

FURTHER INFORMATION

Your inquiry regarding any Solar service or facility will receive courteous attention. Address Solar Aircraft Company, Department A-17, San Diego 12, Calif.

PRODUCTION BRIEFING

▶ **Alloy Precision Castings Co.** has leased entire plant of Industrial Metal Casting Co., a wholly owned subsidiary of Mercast Corp., N. Y., adding 10,000 sq. ft. to APC's present facilities. Address of new plant is 13721 Bennington, Cleveland.

▶ **Aerodex, Inc.,** Miami, Fla., recently was forced to shut down its C-47 overhaul operation for two weeks "due to inability of AF to supply planes." Firm has overhauled 488 C-47s for the U. S. over past three years.

▶ **Fletcher Aviation Corp.** has dedicated the first and largest unit of its new plant headquarters at Fletcher-Rosemead Airport, Rosemead, Calif. The 121,000-sq. ft. plant more than doubles firm's capacity.

▶ **Republic Aviation Corp.,** Farmingdale, N. Y., has granted further substantial F-84F Thunderstreak subcontracts: A multi-million order to Temco Aircraft Corp., Dallas, Tex., for aft fuselage sections, which Temco notes is one of the largest single orders it has received and which ultimately will require an additional 1,200 more personnel, and a contract for similar items to Kaiser Metal Products, Inc., Bristol, Pa.

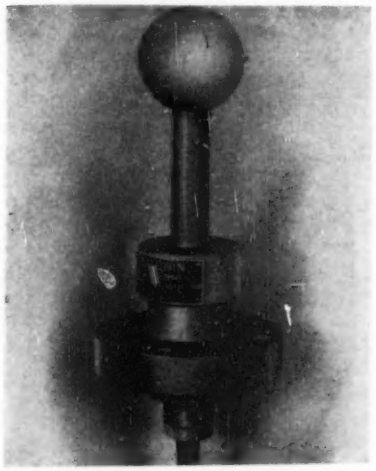
▶ **Robertshaw-Fulton Controls Co.** has completed a $500,000 research and development laboratory at its Anaheim (Calif.) Division. Some 125 engineers and scientists are slated for the new facility within a year. Firm makes components for guided missiles, aircraft assemblies, electronic devices and other items.

▶ **Computer Research Corp.** has become the Electronics Division of National Cash Register Co. Location is El Segundo, Calif.

▶ **Special Machine Tool Engineering Works, New York,** has appointed Roc Engineering Co., Cincinnati, as exclusive sales representative in the midwestern area.

▶ **Microdot Division,** Felts Corp., South Pasadena, Calif., is making Mininoise special coaxial cable available in continuous lengths. Previously the product could be made only in three-foot lengths due to technical difficulties.

▶ **R. B. Pullin & Co., Ltd.,** Phoenix Works, Great West Road, Brentford, England, has been granted MoS approval for gyroscopic instruments.



Wind Sensor

Instantaneous response to sudden changes in wind currents or shock waves is given by this electrically operated sensing unit. The device, used to measure air currents encountered in plane research is also said to be useful in liquid or other mediums. Apparatus consists of 2-in.-dia. hollow metal ball and two Wheatstone bridge circuits consisting of resistance wire strain gages arranged to measure wind force strains from directions at right angles to each other. Maker: Baldwin-Lima-Hamilton Corp., Philadelphia 42, Pa.

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Style II, type r	Type II—Class 1
Style II, type nf	

NOTE: there is also a wide range of Vulcan industrial coated fabrics available to meet the specifications of AMS 3270 b, AMS 3274-A and MIL-C-8068 (USAF), Type 1

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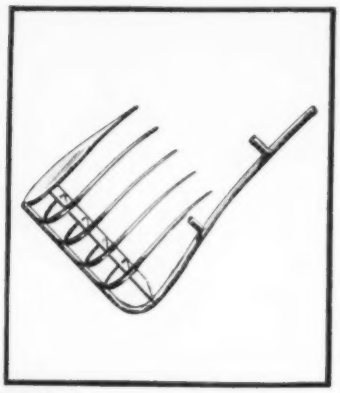

Harvesting with a sickle was a wasteful, back breaking process. When man became dissatisfied with his curved blade, he designed the harvester, a self-propelled vehicle of amazing efficiency.

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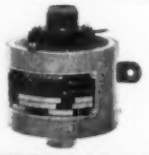

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J. M. WALTHEW CO., Boeing Field, Seattle, Wash. THOMSON ENGINEERING SERVICE, 554 So. Summit St., Fort Worth 4, Texas and 307½ Laura St., Wichita, Kansas. ROUSSEAU CONTROLS Ltd., 2215 Beaconsfield Ave., Montreal 28, Canada. W. M. HICKS & J. A. KEENETH, 42 Third St., Mineola, New York. JOSEPH C. SORAGHAN & ASSOCIATES, 1612 Eye St., Northwest, Washington, D. C.

USAF Contracts

Following is a list of recent USAF contracts announced by Air Materiel Command, Dayton.

Leland Electric Co., 1501 Webster St., Dayton, Ohio, inverter, 188 ea., $83,671.

Lockheed Aircraft Corp., P. O. Box 551, Burbank, Calif., T-33A acft. (MDAP), 87 ea., RT-33A acft. (MDAP), 10 ea., TV-2 acft. (Navy), 40 ea.

Lockheed Aircraft Corp., Georgia Div., Marietta, Ga., tng. parts, tools and equipment, $350,000.

Glenn L. Martin Co., Baltimore, Md., repair of B-57A airplane, $130,319.

Morse Instrument Co., 21 Clinton St., Hudson, Ohio, printer, 2 ea., $34,219.

Motorola, Inc., 2710 N. Clybourn Ave., Chicago, Ill., network, line balancing, $76,079.

North American Aviation, Inc., Los Angeles Intl. Airport, Los Angeles, Calif., tng. parts tools and equipment, $400,000.

Piasecki Helicopter Corp., 100 Woodland Ave., Morton, Pa., instructor services, $282,300.

Piper Aircraft Corp., Lock Haven, Pa., L-21B airplanes, 355 ea., $2,061,396.

Remler Co., Ltd., 2101 Bryant St., San Francisco., Calif., console elec. circuit, 106 ea., trainer, training aid, 449 ea., kit, 208 ea., $391,403.

Scintilla Magneto Div., Bendix Aviation Corp., Sidney, N. Y., lead assy., 1,824 ea., $52,494.

Seaboard Electric Co., 417-421 Canal St., New York, N. Y., control, servo, Type O-5, 271 ea., $55,060.

Southeastern Storage and Processing Inc., Laurinburg Maxton Air Base, N. C., install and erec. fac., $38,000.

Sperry Gyroscope Co. Div., Sperry Corp., Great Neck, N. Y., motor and drive assy., 577 ea., $705,143; flight computer components, maintenance data, 232 ea., $2,706,667.

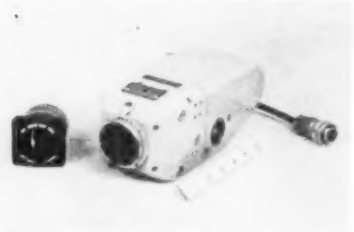
Watts Mfg. Co., Inc., Ronceverte, W. Va., kit, field processing, 56 ea., $32,557.

Western Electric Co., Inc., 120 Broadway, New York 5, N. Y., network, line balancing and equipment parts, $147,682.

Allison Div., Aeroproducts Operations (GMC), Dayton 1, propeller, 238 ea., $7,702,978.

Allison Div., Indianapolis, J33-A-18A engine, spare parts, $233,160.

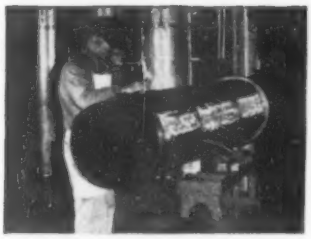
Lycoming Div., Avco Manufacturing Corp., Stratford, Conn., install and rehabilitate machinery and equipment for R1300 engines, $150,000; R1820-103 engines.



Aerial Strike Camera

Lightweight 70-mm. aerial camera for recording rocket and bomb strikes of low-level, highspeed attacks by jet aircraft can take six photographs per second at shutter speeds as high as 1,200th of a second. Developed for Air Force by J. A. Maurer, Inc., Long Island City, N. Y., the P-2 camera can also be used to record the effects of aerial gunnery. Test model shown here, with switch at left, has 50-ft. magazine that provides film for 239 photos over a 39-second period. Another magazine, containing 15 ft. of film for 75 pictures in 12.5 seconds, is also available.

Stainless Steel here...



and Stainless Steel here...

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Tail pipes and exhaust cones are but two applications in which ENDURO proves its ability to withstand the scorching gases that thunder through jet engines. Rotor compressors, turbines, after-burners, and shrouding are others.

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—twin-jet, all-weather interceptor—
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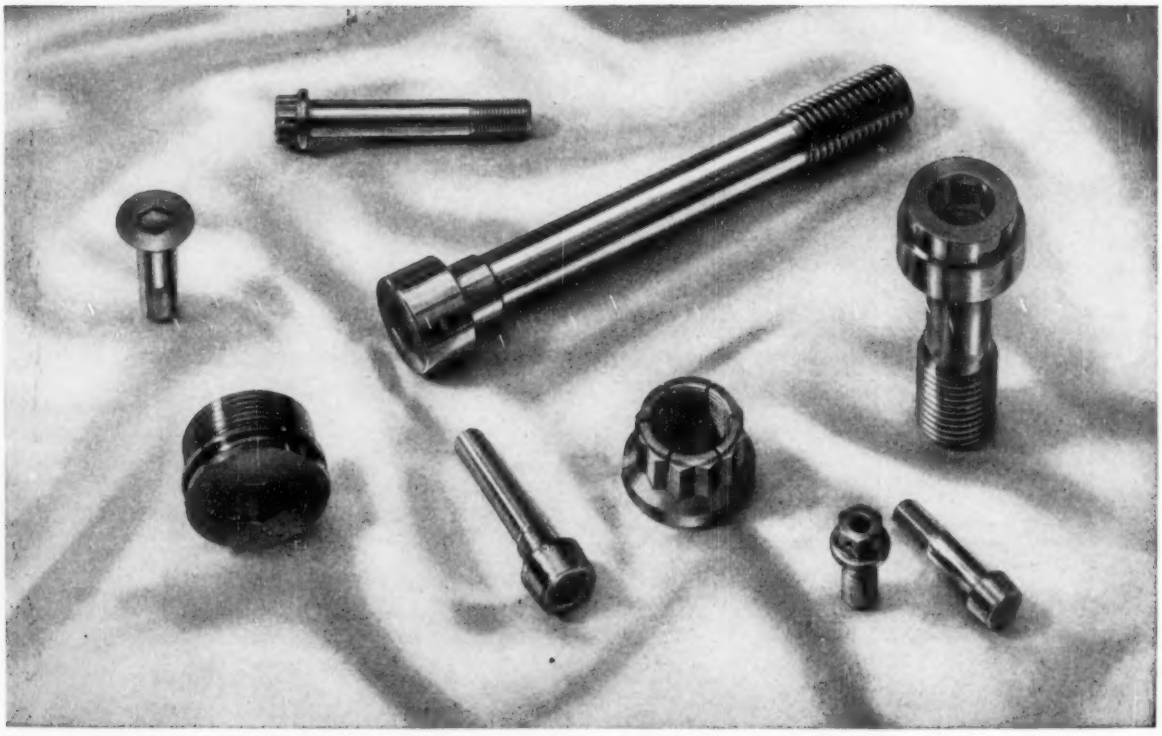

A typical selection of SPS Fasteners. For information, write STANDARD PRESSED STEEL CO., Jenkintown 3, Pa.

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9 ea., R1820-76A engines, 5 ea., 3 ea., $436,100.

Bendix Products Div., Bendix Aviation Corp., South Bend 20, Ind., wheel assy., 3 ea., brake assy., 3 ea., axle assy., 3 ea., $343,106.

Boeing Airplane Co., Wichita, facilities for production of B-52 aircraft, $20,152,000.

Central Commercial Industries, Inc., 1215 West Washington Blvd., Chicago 7, remote tuning assy., 724 ea., $239,811.

Curtiss-Wright Corp., Propeller Div., Caldwell, N. J., design and fabrication of transfer ring system, $76,904.

Eclipse-Pioneer Div., Bendix Aviation Corp., Teterboro, N. J., auto-pilot program production systems S/P, tools and test equipment, $1,586,416; transmitter, fuel flow, special tools, test and GHE, 56 ea., $73,709.

Moviola Manufacturing Co., 1451 Gordon St., Los Angeles 28, viewer MP 35-mm., 83 ea., $29,050.

North American Aviation, Inc., Los Angeles International Airport, Los Angeles 45, repair F-86D airplane, 1 ea., $34,731.

Sikorsky Aircraft Div., United Aircraft Corp., South Bridgeport 1, Conn., helicopters S/P, special tools & GHE, 30 ea., $5,453,066.

Western Electric Co., Inc., 120 Broadway, New York, N. Y., product improvement, 12 ea., $554,400.

Eclipse-Pioneer Div., Bendix Aviation Corp., Teterboro, N. J., indicator-fuel, 730 ea., 363 ea., 350 ea., $64,156.

Elcor, Inc., 1501 W. Congress St., Chicago 7, dynamotors, spare parts, $124,874.

Glassoloid Corp. of America, 32 Wellington St., Clifton, N. J., laminating press, 394 ea., $88,492.

Goodyear Tire & Rubber Co., 1144 East Market St., Akron 16, wheel assy., 278 ea., brake assy., 210 ea., $65,997.

Hoover Electric Co., 2100 South Stoner Ave., Los Angeles, actuator assy., wing flap and horizontal stabilizer, 62 ea., 10 ea., $27,630.

Johnston Foil Manufacturing Co., 6106 South Broadway, St. Louis, chaff, 59,290 cartons, $1,437,961.

Lear, Inc., 110 Ionia Ave., N. W., Grand Rapids, Mich., components of F-5 automatic pilot S/P and special tools, $1,482,801.

The following contract awards were recently announced by Gentile Air Force Depot, Dayton:

CBS-Hytron, 100 Endicott St., Danvers, Mass., tube, electron, JAN type 5814 WA, receiving, twin triode, general purpose, 18,197 ea., $40,033.

Cook Electric Co., 2700 North Southport Ave., Chicago 14, Ill., switch, pressure, required for F-80A, 20 ea., switch, pressure, required for T-33 and F-89, 500 ea., $40,860.

Eclipse-Pioneer Div., Bendix Aviation Corp., Teterboro, N. J., stand, engine power control test, 16 ea., $284,932.

General Radio Co., 275 Massachusetts Ave., Cambridge 39, Mass., analyzer, spectrum, 30 to 45,000 cyc. freq. range, 108 ea., $54,621.

Gray Instrument Co., 64 West Johnson St., Philadelphia 44, Pa., tester, electric thermometer, type N-3, 129 ea., $87,627.

Raytheon Manufacturing Co., 55 Chapel St., Newton 58, Mass., tube, electron, receiving pentode, general purpose, 363,630 ea.; tube, electron, JAN type 5670 WA, receiving triode, 29,000 ea., $838,017.

The following contract awards were recently announced by Middletown Air Materiel Area, Middletown, Pa.:

Durham Aircraft Service, Inc., 56-15 Northern Blvd., Woodside 77, N. Y., overhaul of Wright reciprocating engine spare parts, 15,539 ea., $311,500.

General Electric Co., 1405 Locust St., Philadelphia 2, Pa., meter, frequency, a.c., 400-c., Type A-1, 394 ea., $68,556.

Sperry Gyroscope Co. Div., Sperry Corp., Great Neck, N. Y., switch, selector, rotary, flight computer, 195 ea., $36,695.

Wickes Engineering & Construction Co., 1441 Second Ave., Des Moines 14, Iowa, erection of antenna farms at remote transmitter and remote receiver sites, $27,787.

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"Lost, yesterday, somewhere between sunrise and sunset, two golden hours, each set with sixty diamond minutes. No reward is offered for they are gone forever."

. . . HORACE MANN

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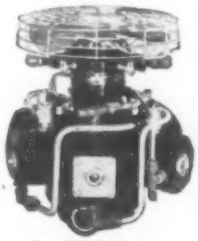
Why don't *you* spend the time *now* to find out more about Cornelius products and the advantages they can impart to *your* products? It will be time *well* spent.



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Northrop Buys New Giant Stretch Press

A giant stretch press is being added to the battery of production tools at Northrop Aircraft, Inc., Hawthorne, Calif. Installed in conjunction with USAF, the press was purchased from T. W. & C. B. Sheridan Co., New York, designed by the latter's subsidiary, Sheridan-Gray, Inc., Palos Verdes, Calif.

The machine will accommodate aluminum sheets as large as 14 by 20 ft., will have a rated stretching force of 750 tons, will stretch-form stock ½ in. wide by 3 ft. long.

OVERSEAS SPOTLIGHT

V-Bomber Sizes Revealed

LONDON

Size of Britain's two super-priority V-bombers has been revealed. According to Flight magazine, Avro Vulcan has 99-ft. span, 97 ft. 1 in. length, 26 ft. 6 in. height. The Handley Page Victor has 110 ft. span, 114 ft. 11 in. length, 26 ft. 9 in. height. Prototype Victor crashed in July when tail ripped loose, but second prototype may fly at the SBAC Farnborough display this month.

By contrast with the V-bombers, Air Force's Boeing B-52A has 185 ft. span, 153 ft. length, 48 ft. height, and B-47A Stratojet measures 116 ft. in span, 106 ft. 8 in. long, 27 ft. 11 in.

Fleuret 2's First Flight

PARIS

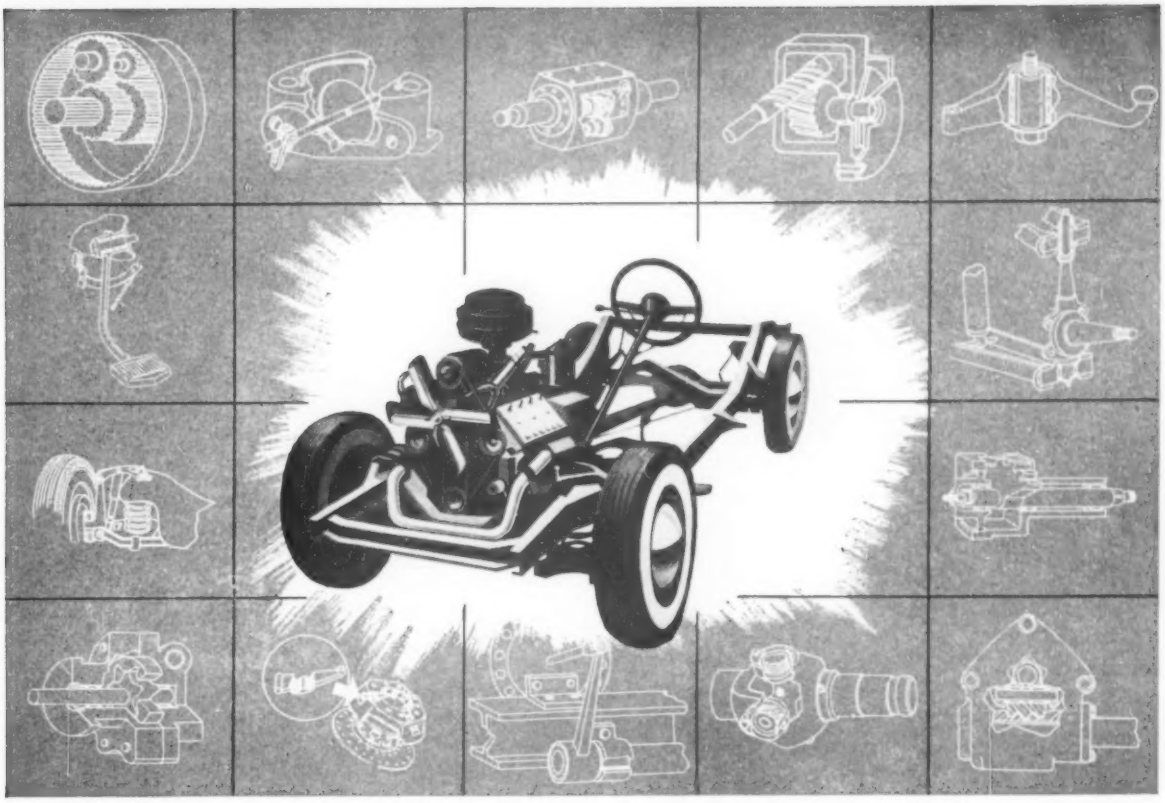
The Morane-Saulnier M.S. 760, four-seat jet liaison plane made its first flight late in July.

Developed from the M.S. 755 Fleuret two-seater, which competed unsuccessfully against the Fouga Magister 170R, Fleuret 2 is powered by two Turbomeca Marbore 2 jet engines of 880-lb. thrust each. Maximum cruise speed at 20,000 ft. is given as 358 mph.; at sea level, 420 mph.

British Test Noise Mufflers

LONDON

Several British manufacturers are working on designs for mobile sound mufflers to alleviate the jet noise prob-



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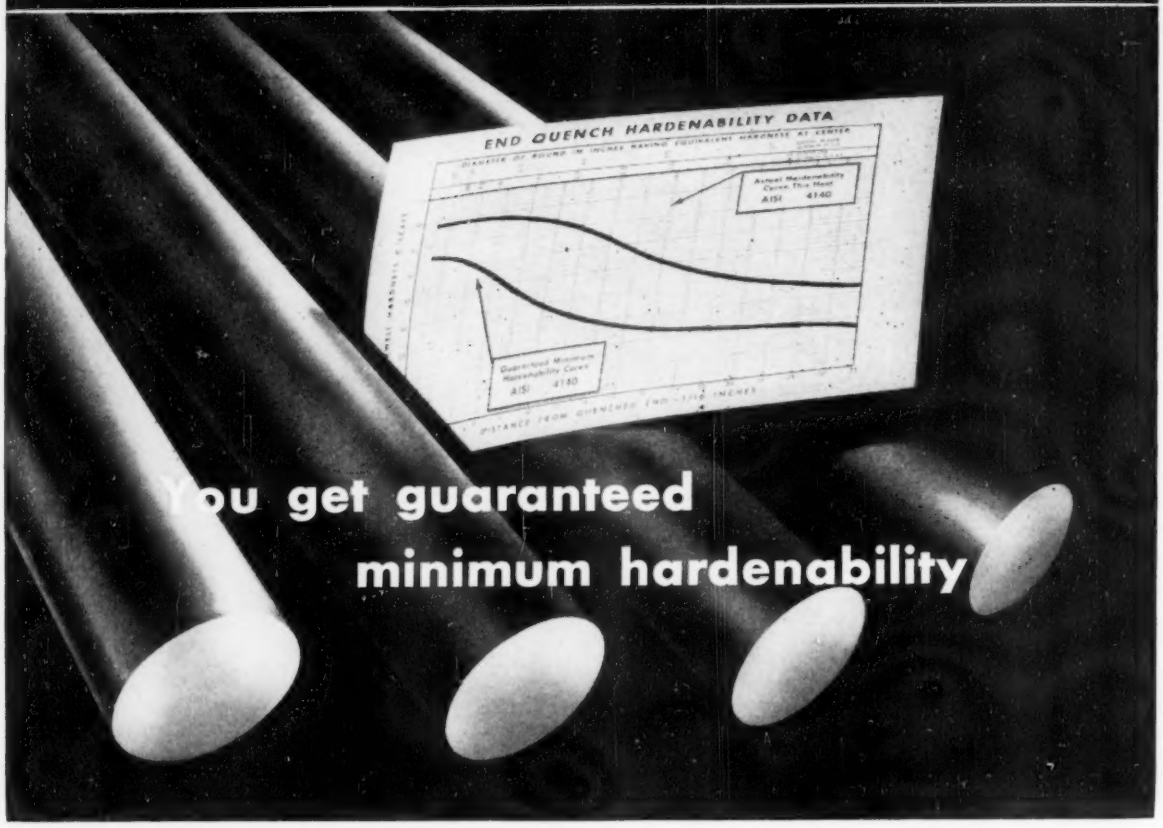

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lem at airports and test sites, says the Times Review of Industry.

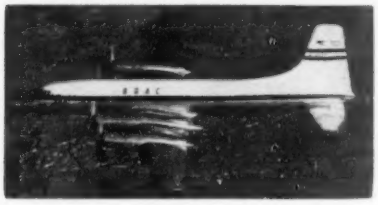
These mufflers would be mounted on small trucks and towed to the aircraft to be silenced. In one version, there would be a muffler for each engine, a funnel-shaped adapter connecting the muffler to the jet tailpipe. For four-engine craft, a muffler is proposed that would be attached to a pair of engines simultaneously.

The Society of British Aircraft Constructors says that work also is being done in silencing the engines themselves. Tests thus far indicate that noise suppression can be attained without substantial reduction of thrust or change in fuel economy. Only effect noted has been a slight increase in tailpipe temperature.

Britannia Flies Again

LONDON

The Bristol Britannia No. 2 prototype flew again early last month after being grounded for two months due to excessive rolling, which was blamed on flap failure.



In February, the plane made a forced landing on a mud flat in the Severn River when fire broke out in one of its four Proteus turboprop engines during a demonstration flight.

Flights Avoid China Reds

HONG KONG

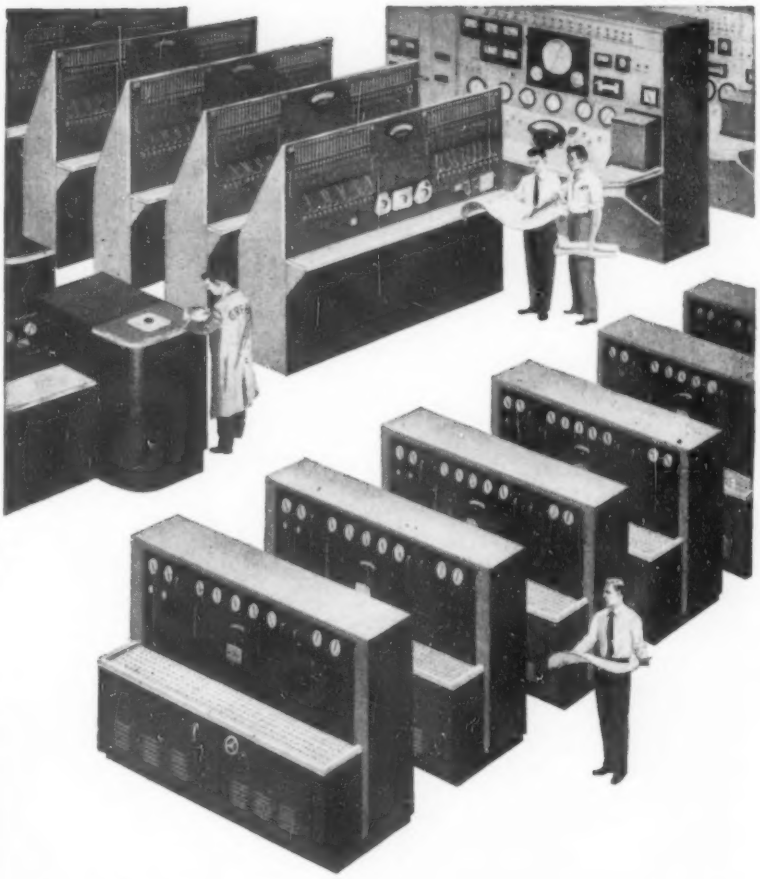
Following the "incident" in which Chinese Communist fighters shot down a British Cathay Pacific transport July 23, most international airliners calling at Hong Kong have moved their routes very much farther south off Hainan Island.

Cathay Pacific Airways has temporarily suspended this route between Bangkok and Hong Kong.

Reds Report on Production

Russia's newly released semi-annual report of industrial production omits any reference to the aircraft industry but claims continued progress in allied fields.

Output of aluminum, ball and roller bearings, metal-cutting machinery and petroleum exceeded government-set quotas during first half of 1954, according to the report quoted in Izvestia.



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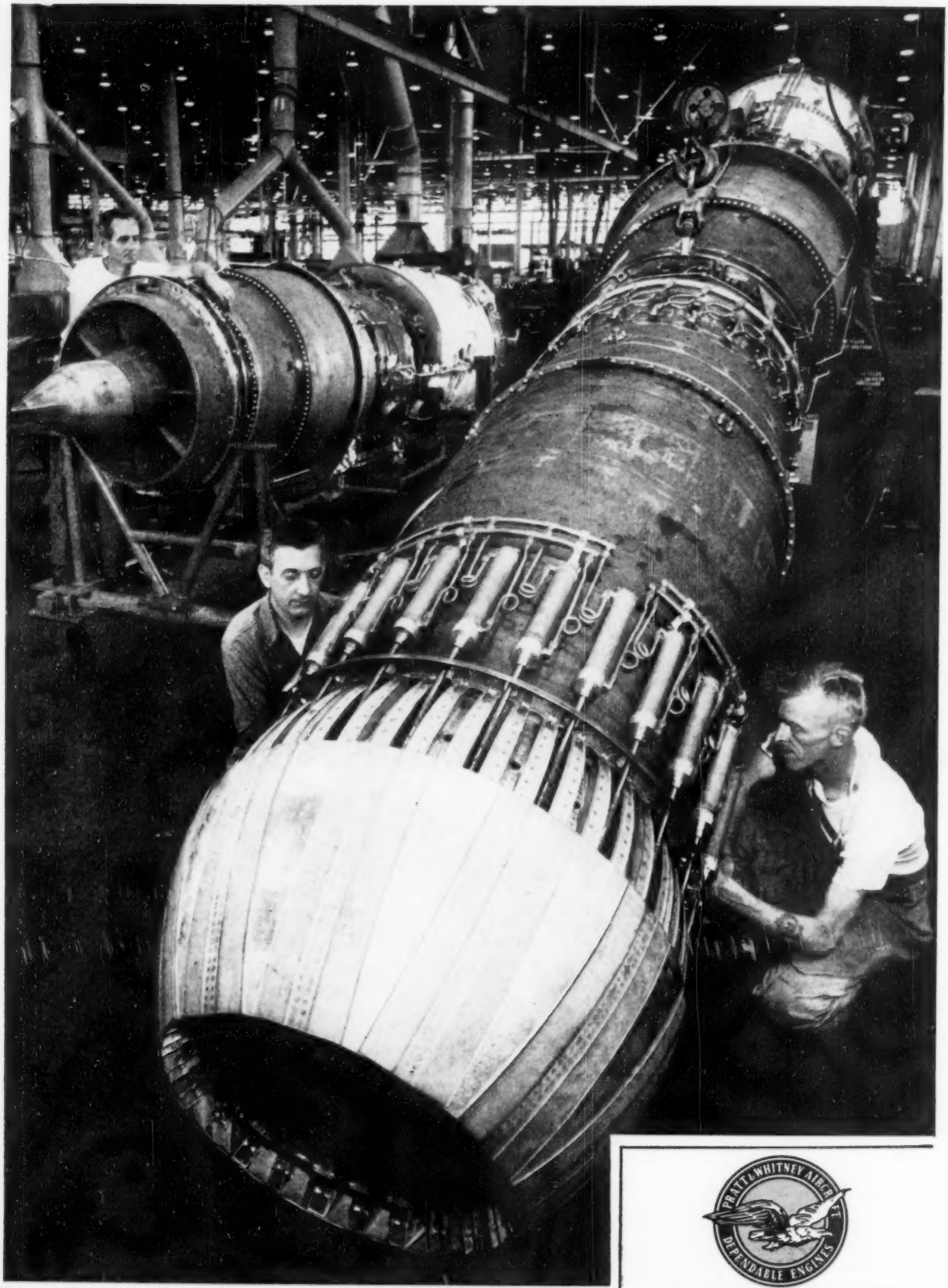

Power behind the F4D's superlative performance is provided by one 10,000-pound thrust class Pratt & Whitney Aircraft J-57 turbojet, equipped with afterburner for short periods of huge additional power.

PRATT & WHITNEY AIRCRAFT
DEPENDABLE ENGINES

ONE OF THE DIVISIONS OF
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The sleek Douglas F4D is the latest carrier-based interceptor and the Navy's first combat aircraft to outspeed sound in level flight. Production airplanes, now coming from the Douglas El Segundo plant, are powered by Pratt & Whitney Aircraft's J-57 engines.

Skyray has High Performance with J-57 Power Plant

When it comes to interceptor performance, few combat planes can match the Douglas F4D Skyray, one of the aircraft bringing a new potency to Navy carrier aviation.

The Pratt & Whitney-powered Skyray is the Navy's first supersonic combat airplane, and one of the fastest aircraft in the world. Its rate of climb and many abilities at design altitude are unique among fighter aircraft. It is in production and scheduled for service with the Fleet in 1955.

In the Skyray, and in other combat airplanes, performance of Pratt & Whitney Aircraft's J-57 turbojet is fully justifying the long years and intensive effort required for its development and production.

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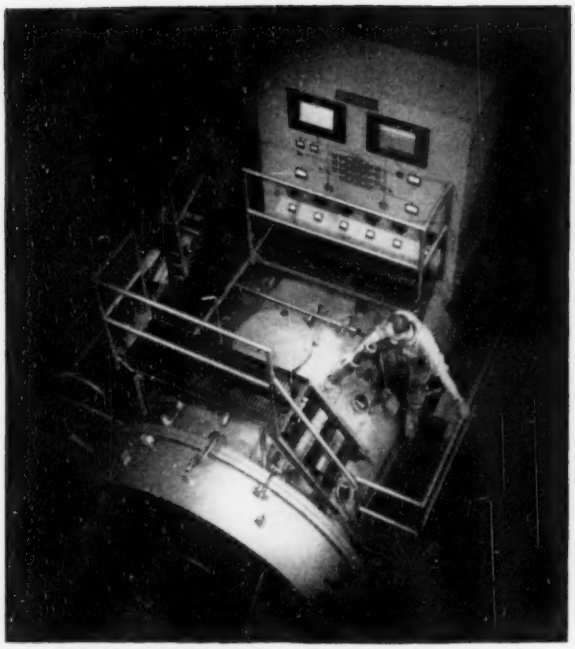


HIGH-PURITY, HIGH-HEAT-RESISTANT jet alloys are produced in vacuum furnaces at Utica Drop Forge (left) and GE (right). The Utica unit, designed and built by F. J. Stokes Machine Co., has 1,000-lb. capacity, is said to be the largest of its type ever constructed.

Vacuum Melting Improves Turbine Alloys

Vacuum melting of metals is taking on increased significance for improving strength characteristics of high temperature alloys used in jet engine turbine sections.

Aircraft industry metallurgists are using the process to obtain high purity metals, with accurate control of alloying elements. One researcher sees it as giving metallurgists a new-found freedom in choosing elements for alloying, unhampered by adverse effects of gases present in the atmosphere or trapped in the metals.

CRUCIBLE in GE experimental furnace holds metal for vacuum melting.

► **Engine Application**—At least two major jet engine manufacturers—United Aircraft Corp.'s Pratt & Whitney Aircraft Division and General Electric Co.'s Aircraft Gas Turbine Division—are profiting from this relatively new method for processing metals.

While there has been no statement by P&WA, this company's Waspaloy produced by the vacuum melting technique probably will be incorporated in the turbine section of the 10,000-lb.-thrust J57.

P&WA has announced that the material is being used in turbine buckets of the company's J48 (AVIATION WEEK Aug. 2, p. 11), a centrifugal flow engine with a basic thrust rating of 7,250 lb.

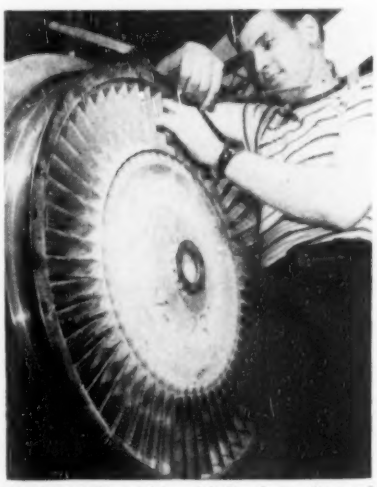
Tests conducted early in 1950, with Waspaloy substituted for the turbine bucket material in the J48, boosted the thrust more than 10% over the engine's previous rating. Later, Waspaloy buckets performed successfully when additional design changes called for even higher temperatures in the J48.

► **Increased Life**—Further tests by Utica Drop Forge & Tool Corp. and P&WA metallurgists have shown vacuum melting of Waspaloy increases the stress rupture life of turbine buckets two and a half times over conventionally treated material, it is reported.

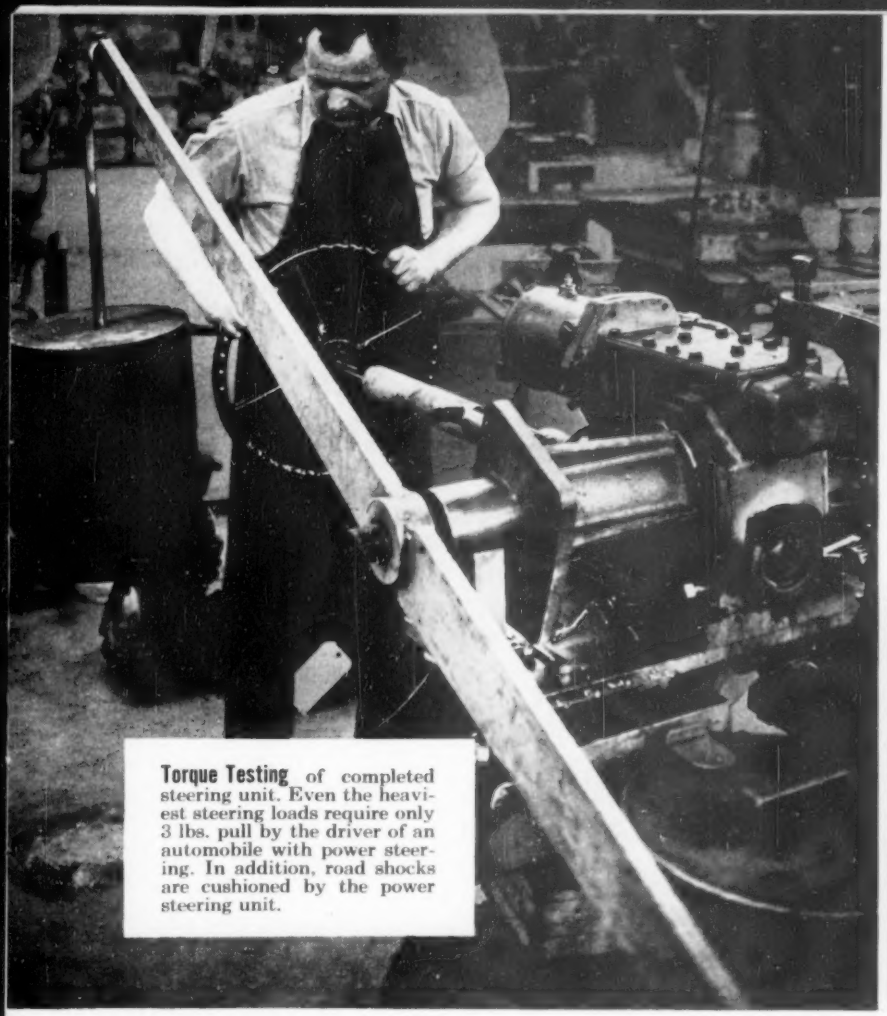
The stress rupture value of the vacuum melted buckets increased from minimum of 40 hr. at 1,500F at 32,500 lb. to a minimum of well over 75 hr. The buckets have been run in J48s at P&WA for more than 2,000 hr. with outstanding results, it is said.

Engineers at P&WA believe that Waspaloy possesses greater heat-resisting qualities at the operating temperatures of 1,500-1,600F than any other known wrought alloy, the company says.

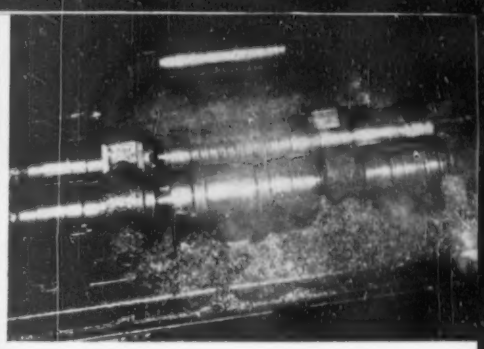
► **1,000-lb. Furnace**—A new, 1,000-lb.-capacity vacuum furnace—reported to be the largest ever constructed for



WASPALOY turbine blades have boosted thrust of P&WA J48 engine.

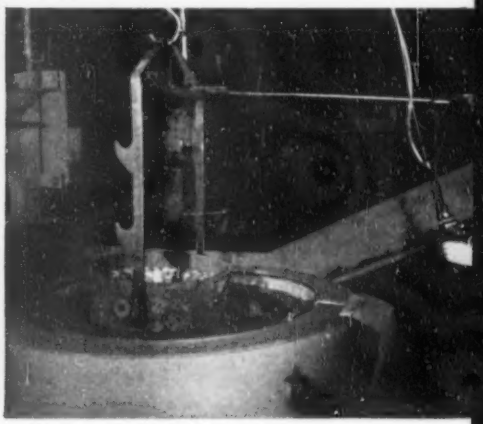


Torque Testing of completed steering unit. Even the heaviest steering loads require only 3 lbs. pull by the driver of an automobile with power steering. In addition, road shocks are cushioned by the power steering unit.



Worm Shafts are ground to within .0005". Alloy steel must be used for these parts so that they can be quenched in oil with a minimum of distortion to maintain the close tolerances.

Heat Treatment USS CARILLOY steels have the uniformity in response to heat treatment that is so necessary to obtain the high strength, adequate ductility and minimum of distortion required in power steering units.



USS CARILLOY STEELS MINIMIZE DISTORTION

in Power Steering Units for Cars

Power steering units are precision machines. Every part must fit exactly. Parts must be interchangeable. They must be made to finished tolerances as small as .0001". They must be heat treated with minimum distortion.

These rigid requirements dictate the use of accurately controlled *alloy* steels that can be *quenched in oil*. These steels must respond uniformly to heat treatment, time after time, so that many thousands of parts can be made—*all exactly alike*. USS CARILLOY steels are used extensively in power steering units because they help to insure the uniformity that is essential in all critical parts.

CARILLOY steels are giving excellent service daily in a wide variety of precision parts for automobiles, aircraft, trucks, farm equipment, construction machinery, rotating machines, and other applications. These high quality steels meet the toughest requirements known to industry. They can meet yours. For information write to United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

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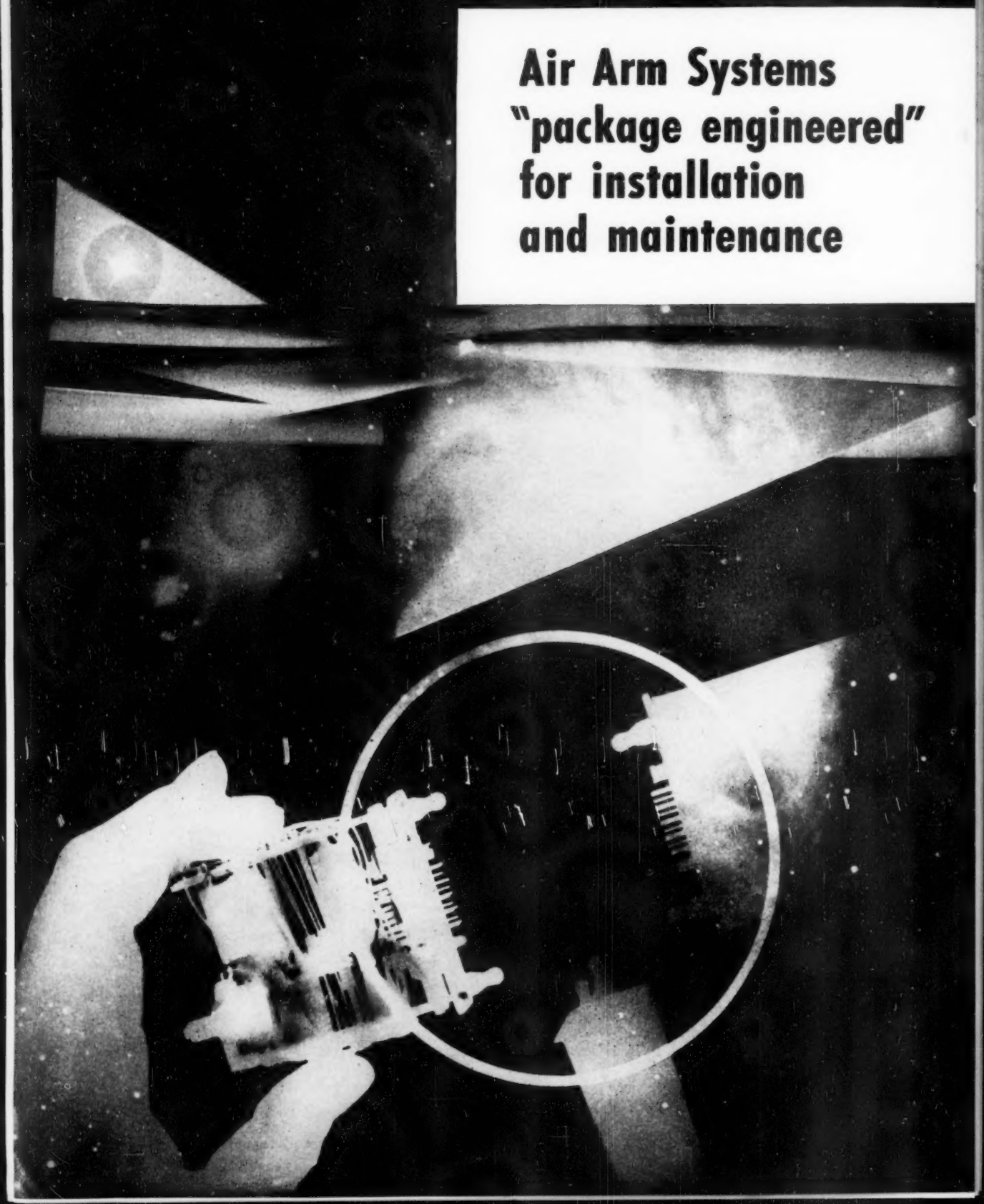
TOMORROW'S AIRCRAFT: *One step closer*

Air Arm Systems "package engineered" for installation and maintenance



Quicker installation and easier maintenance . . . important plus-features for airborne electronics equipment are a reality at Air Arm. The basic Air Arm approach to *all* electronic problems, combined with inherent ingenuity and capability, has led to concepts such as pallet packaging, encapsulated and functional circuitry, built-in test points . . . to mention just a few.

Applying these concepts to all Air Arm systems gives outstanding features . . .

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MAGAMPS, potted units and other proven developments for weight and size reduction are a basic part of the new packaging concepts. Electronic circuits are physically combined and integrated into compact subassemblies—each of which has a single major function. Thus, over-all packages are made up of functional units of complete systems.

This "package-engineering" results from intense Air Arm development and close Air Arm association with the special problems of airframe design and operational requirements. Such achievements in electronic-mechanical design are typical of Air Arm's efforts to bring simplicity and increased reliability into airborne systems, thus bringing tomorrow's aircraft—One Step Closer. Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pennsylvania.

J-91019

MAGAMPS typify the "package-engineering" which Air Arm applies to airborne systems. Simple and reliable as iron and copper, they are a rugged replacement for vacuum tubes. Wherever such packaging is used, maintenance is reduced, circuitry is simplified and systems are far more dependable.

The most advanced state-of-the-art is always brought to bear in Westinghouse design, evaluation and improvement of airborne systems. For example, human engineering studies help technicians perform tasks quickly, simply and surely—thus building the greatest amount of dependability into the system.

Jet Propulsion • Airborne Electronics • Aircraft Electrical Systems and Motors • Wind Tunnels to Plastics

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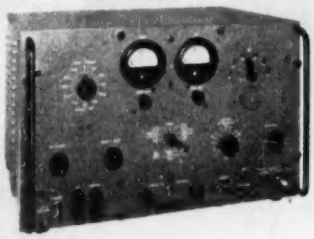

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melting and centrifugally casting high-temperature alloys—recently was installed at Utica Drop Forge. Another unit of this size also is under construction for the company.

Designer and builder of the furnaces is the F. J. Stokes Machine Co., Philadelphia, which reports that Utica will use the equipment to make high-purity alloys of superior heat resisting properties for use in turbine blades and disks "of advanced jet engines." As previously conjectured, these engines probably will include the P&WA J57.

Utica's new furnace performs all the heating, melting, alloying and casting operations within the vacuum chamber, Stokes reports. By melting and casting the alloys under high vacuum, alloying elements such as titanium and molybdenum—which oxidize and are lost during atmospheric processing—are conserved and more economically used because their hardening qualities are fully effective in smaller quantities than normally needed, Stokes says. Also, elimination of dissolved gases and inclusions improve the alloy.

Thompson Products, Inc., major manufacturer of jet engine components and a pioneer in blade research, also is scheduled to get one of the Stokes vacuum melting furnaces, AVIATION WEEK has learned.

▶**GE's New Alloy**—Experiments with high-vacuum furnaces at General Electric's Research Laboratory at Schenectady, N. Y., have produced a new alloy capable of withstanding higher temperatures than any wrought alloy now commercially available, GE's vice-president and director of research, Dr. C. Guy Suits, reports. GE's Dr. Thomas Prater and Dr. Dolph Eberling formulated the alloy's chemical composition.

This alloy will be produced by the company's Carboloy Department, with initial commercial output at Schenectady from a 400-lb.-capacity vacuum furnace—a pilot plant operation capable of producing 100,000 lb. of high temperature alloys annually.

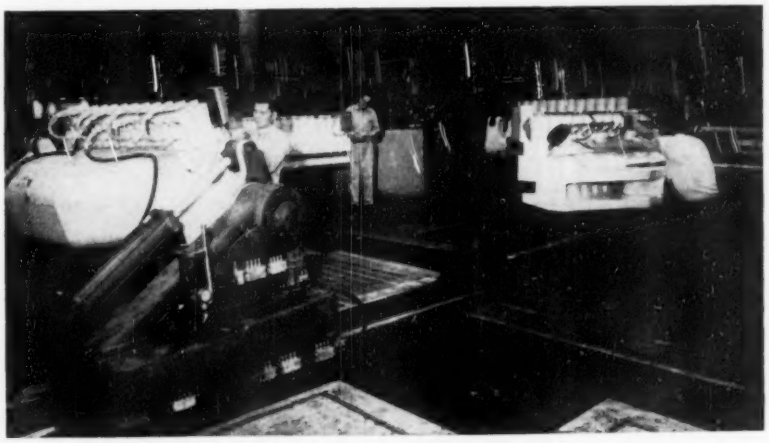
Vanadium-Alloys Steel Co., Latrobe, Pa., will convert the 400-lb. ingots into bar, strip, sheet and other desired forms.

Carboloy's plans contemplate increasing developmental engineering personnel and melting facilities. Vacuum melting will be done in furnaces ranging in capacity from 100 to 1,000 lb., expected to be in operation in Detroit by March 1. Carboloy's activities in the vacuum melted field will be backed by many years of basic research conducted by the GE Research Laboratory's Metallurgical Department, in Schenectady.

▶**Temperature Extremes**—Dr. Suits explains that there is a distinct weakening of mechanical properties in fabricated products through impurities unintentionally introduced in a given melt under ordinary furnace operations. These characteristics are particularly accentuated in the field of high temperature alloys, where materials are subjected to extremes of stress and temperature.

These extremes magnify the consequences of defects and impurities which may be tolerable in alloys for use at lower temperatures.

GE metallurgists believe they have developed a process controllable on a large scale, which will facilitate the melting of highly reactive metals, and open new fields of alloy composition. Vacuum melting, they say, opens the way to the use of quantities of such reactive elements as titanium, zircon-



The Big Stretch

This huge stretch press, installed at Convair's Fort Worth facility, can handle ¾-in. aluminum alloy (or its equivalent) 6x22 ft. in size. Machine's four giant jaws work in pairs. One set can rotate for forming complicated contours. The press weighs more than 200 tons, has 750-ton capacity, was built by T. W. and C. B. Sheridan Co.

num and aluminum in alloys impossible to achieve under conventional melting methods.

▶**Melt Procedure**—Robert McKechnie, GE research associate in the Materials and Process Section, who emphasizes "the new-found freedom metallurgists now have in choosing the elements they wish to unite as alloys," describes the GE-developed vacuum furnace as a gas-tight chamber from which air is pumped and gases removed, both prior to and during processing of each melt.

This removes the contaminating atmosphere, pumps away the deoxidation products. Within the chamber hoppers feed a centrally located, induction-heated crucible from which molten alloys may be poured into a mold.

Entirely automatic operation, not achieved yet, is not impossible, he concludes.—IS

Navy Contracts

Contracts recently announced by the Navy's Aviation Supply Office, 700 Robbins Ave., Philadelphia 11, are:

Adel Div., General Metals Corp., 10777 Van Owen St., Burbank, Calif., hydraulic valve assy., 345 ea., $149,516.

Aircooled Motors, Inc., Liverpool Rd., Syracuse, N. Y., maintenance parts for various engines, $48,435.

Ampruf Paint Co., Inc., 10925 Schmidt Rd., P. O. Box 508, El Monte, Calif., resin (Saran) vinylidene solution, 14,000 gal., $28,260.

Blue Anchor Overall Co., Inc., 1826 E. Somerset St., Philadelphia 34, Pa., summer flying suit, 19,500 ea., $200,850.

Allen D. Cardwell Electronics Production Corp., 97 Whiting St., Plainville, Conn., parts, counter, cam, $45,152; various assys. used on AN-GMDIA equipment, $64,285.

Continental Aviation & Engr. Corp., 1500 Algonquin Ave., Detroit 15, Mich., maintenance parts for support of Continental R975-46 engines, $609,567.

Eclipse-Pioneer Div., Bendix Aviation Corp., Teterboro, N. J., maintenance parts for various aircraft, $34,728.

Embe Gear Works, 730 Salem St., Glendale 3, Calif., actuator, 148 ea., $91,688.

B. F. Goodrich Co., 1112 Nineteenth St., N. W., Washington, D. C., tires and tubes, $25,830.

Hydro-Aire, Inc., 3000 Winona Ave., Burbank, Calif., maintenance parts for various aircraft, $34,320.

Lear, Inc., 110 Ionia Ave., N. W., Grand Rapids, Mich., drive-motor assy., 128 ea., $43,338.

Met-Pro, Inc., 5th and Mitchell Ave., Lansdale, Pa., engine stand, 182 ea., $131,950.

Scintilla Magneto Div., Bendix Aviation Corp., Sherman Ave., Sidney, N. Y., harness assy. and maintenance parts for P2V-5 aircraft, $38,072.

Sherwin-Williams Co., 325 N. Broad St., Philadelphia 7, Pa., paint, copper, $29,725.

Stewart-Warner Corp., South Wind Div., 1514 Drover St., Indianapolis 7, Ind., heaters, $89,182.

Thompson Products Inc., 23555 Euclid Ave., Cleveland 17, Ohio, fuel pumps, $46,092.

Titeflex Inc., 500 Frelinghuysen Ave., Newark 5, N. J., ignition harness assy., $26,344.

Hamilton Standard Div., United Aircraft Corp., Windsor Locks, Conn., material for use on HSD propellers, $57,891.

Vickers, Inc., 1400 Oakman Blvd., Detroit 32, Mich., maintenance parts for various aircraft, $29,095; motor assy. and spare parts, 231 ea., $84,343.

AIRCRAFT ENGINE BUILDERS LOOK TO

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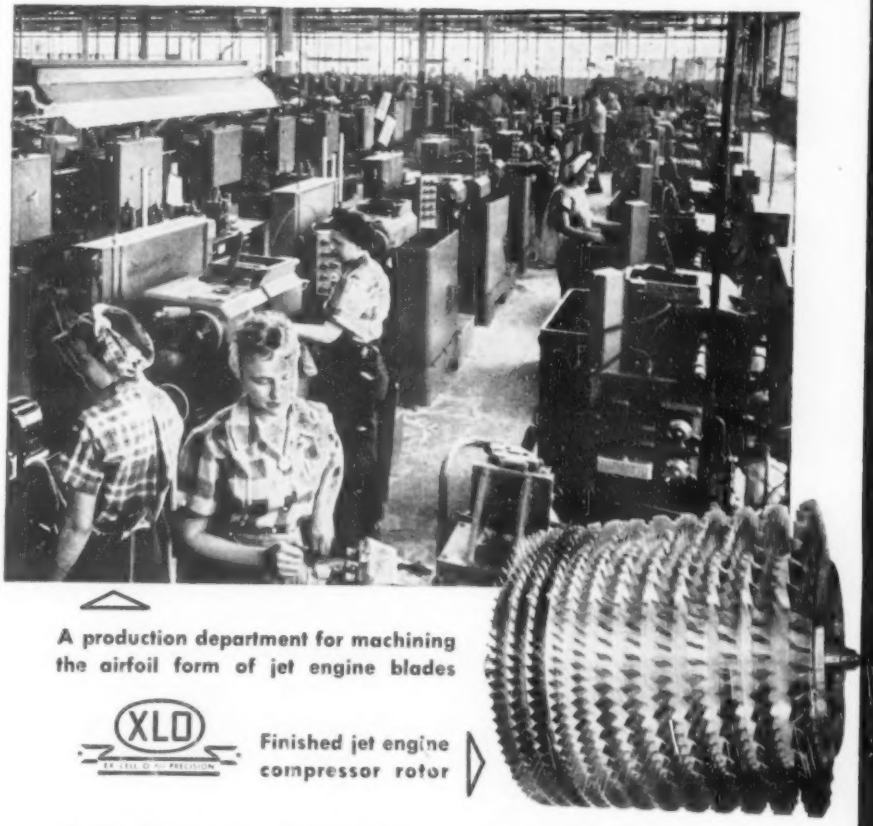

A production department for machining the airfoil form of jet engine blades

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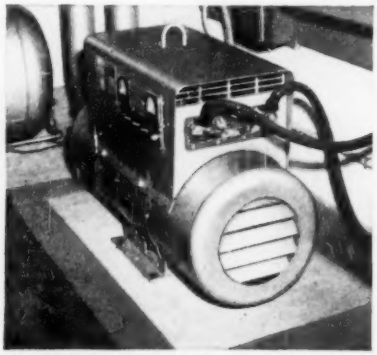
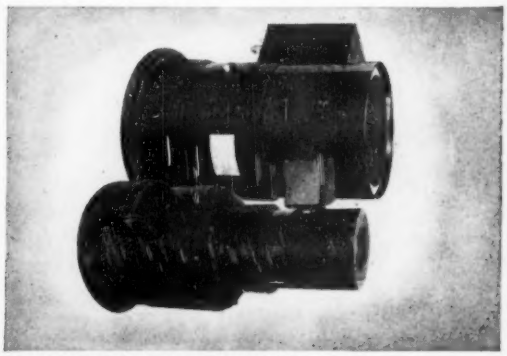


MOTOR DRIVEN UNITS, like this one in a jet engine test power room, are available in 265-, 500- or 1000-amp, 28-volt ratings. Suitable for mobile use or stationary installations, these units give you accurate and more reliable ground power.



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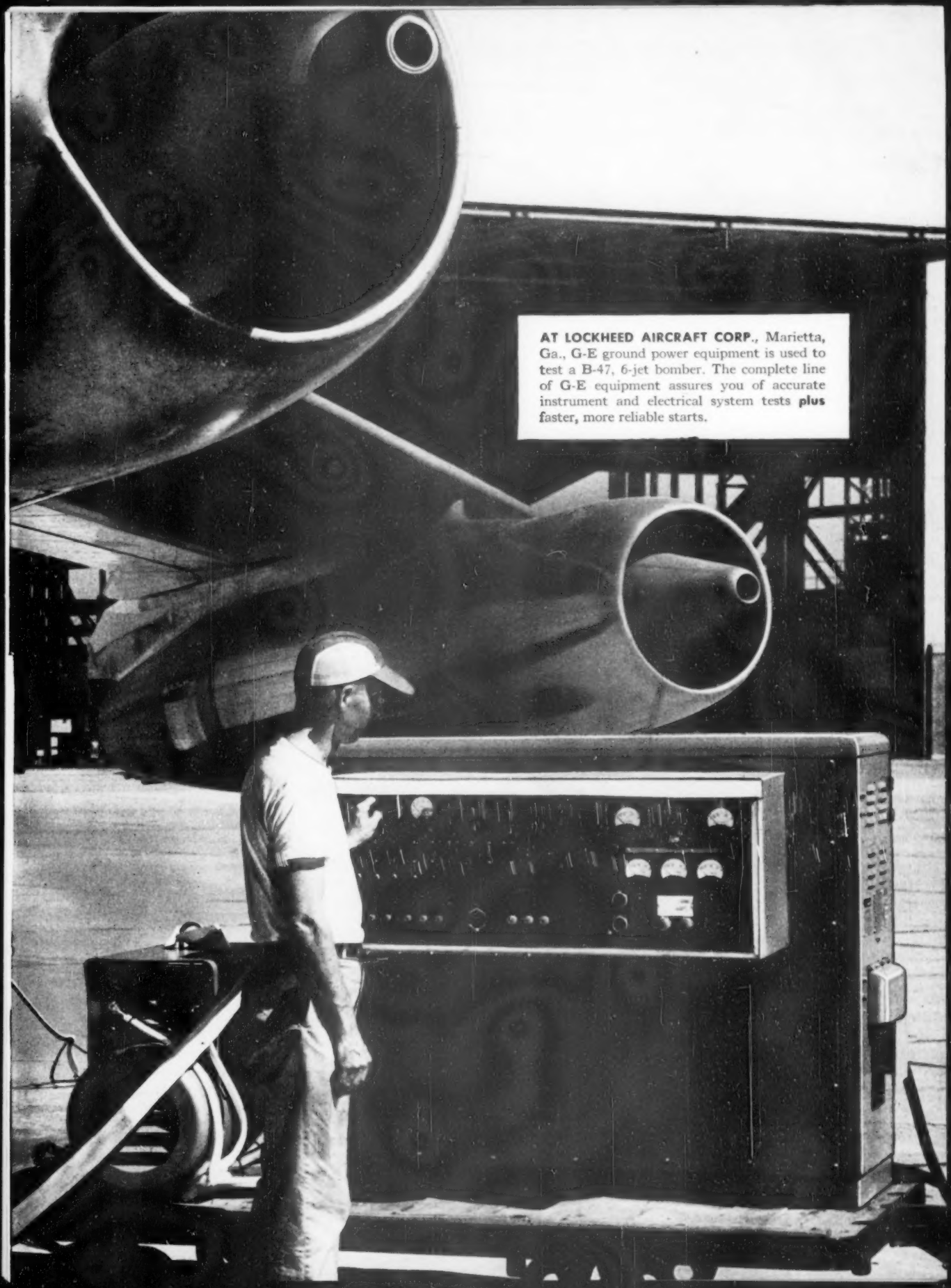


AT LOCKHEED AIRCRAFT CORP., Marietta, Ga., G-E ground power equipment is used to test a B-47, 6-jet bomber. The complete line of G-E equipment assures you of accurate instrument and electrical system tests **plus** faster, more reliable starts.

MB Tackles Jet Vibration Problems

• Control of 'shake' gets more important and more difficult as engines get larger and more powerful.

By George L. Christian

New Haven—Vibration, far from being virtually non-existent in turbojet engines, not only does exist but is becoming an important problem. As engines grow more powerful and larger, says MB Manufacturing Co., vibration isolators will have to be designed to cope with the problem.

The reasons, according to MB: Larger engine diameters will result in greater unbalance of the rotating parts (unless they are manufactured and maintained in operation to even finer tolerances than now used) and slower rpm. (to keep tip speeds subsonic), resulting in greater vibration amplitude.

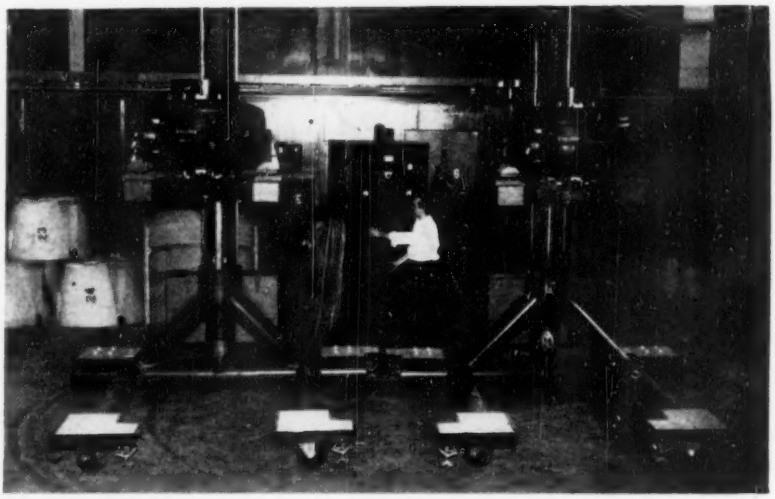
▶ **Today's Engines, Too**—MB engineers believe that perhaps current engines also should be mounted on vibration isolators, not so much for reasons of safety, as comfort.

They cite incidents of fighter pilots who have "squawked" their planes and refused to take off because they detected vibration or sounds they interpreted to mean incipient engine failure. When the engines were inspected, they were found to be within acceptable operating limits. However, the engine's vibration especially in single-engine aircraft, is translated into unpleasant high-frequency noise and vibration and transmitted to the nearby cockpit through the fighter plane's relatively rigid fuselage structure, MB says.

These problems do not exist to the same degree on flexible-wing bombers such as the B-47 and B-52; furthermore the engines are located quite a distance from the cockpit.

▶ **Isolate, Excite & Measure**—MB claims to be the only company in the U.S. which is actively engaged in the development and manufacture of equipment, machines and instruments which cover all phases of vibration control—isolation, excitation and measurement.

To cope effectively with the many attendant problems, the company has assembled a staff of engineering specialists in the vibration field and a complete line of testing equipment and the diversified manufacturing facilities required to pursue research in this expanding field.



TWO MB EXCITERS (l. and r.) are used by Bell Aircraft Corp. for missile test work.

▶ **In Production**—In full production on vibration isolators for turboprop powerplants (the MB-5100 for Pratt & Whitney Aircraft's T34 scheduled for the Douglas C-133A, Lockheed YC-121F and Boeing YC-97J), MB has also supplied isolators for a number of other turboprop aircraft, including Douglas YC-124B and A2D; Lockheed R7V-2; Boeing XB-47D; North American XA2-J; Convair's two turboprop-powered Convair-Liners—the Turboliner (240) and the YC-131C (340); Convair's VTO aircraft, the XFY-1. MB vibration isolators are also used on Continental-made Turbomeca Marbore 340 gas turbine engines installed in the Ryan Firebee target drone.

MB has long been in the business of isolating vibration in reciprocating aircraft engines. It has manufactured and sold engine mounts for every production P&WA piston engine from the R985 to the R4360 (except some early-model R1830s), the Wright R3350 and Continental GR-9 and -9A.

Now, under chief engineer Karl Unholtz, MB engineers are tackling the many, little-known problems of vibration isolation for pure jet engines.

Isolation

When the company grappled with the problems of isolating turboprop vibration, it was not surprised to find a host of new considerations to cope with.

Unholtz told AVIATION WEEK that the problem of designing vibration isolators for turboprops posed a dilemma. MB had to meet conflicting requirements of providing mounts with both greater flexibility and greater rigidity.

• **Mounts with greater flexibility** were called for by the fact that turboprop engines develop more horsepower, yet weigh less than comparative piston engines. The greater-horsepower-with-less-weight combination results in greater motion of the engine on its supports, aggravating the problem of designing a satisfactory mount.

Unholtz states the situation this way: More power means a larger propeller to absorb the power. A larger prop means a slower prop so that tip speeds remain subsonic. Slower rpm. means that the prop sets up lower frequency vibrations. Lower frequency vibrations require more flexible mounts to isolate them. And the relatively lower weight of the engine means that there is less relative mass to resist vibration.

More-flexible mounts are larger and heavier units, giving the airframe manufacturer a tougher engine installation problem. He must design engine controls, fluid connections (fuel, oil and hydraulic), and exhaust connections which are capable of bridging the gap from rigid nacelle to mobile engine without being affected by the latter's motion.

• **Greater rigidity.** Then comes the conflicting requirement of rigidity in the vibration isolators. Rigidity is needed to avoid excessive engine motion (relative to the surrounding structure) caused by such forces as torque, thrust, maneuver loads and gyroscopic effect. The latter is becoming more

RIGHT TO THE TOP—The Beechcraft T-34 Mentor shows in this unusual performance-photo one of the reasons why it has won *every evaluation* contest in which it has participated since the flight of the first prototype on December 2, 1948. Developed by Beech Aircraft as a private venture, the Beechcraft T-34 has been adopted as the official trainer for the U. S. Air Force, the U. S. Navy, and the air services of Canada, Chile, Colombia, El Salvador, and Japan.

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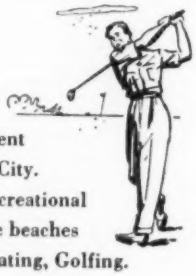

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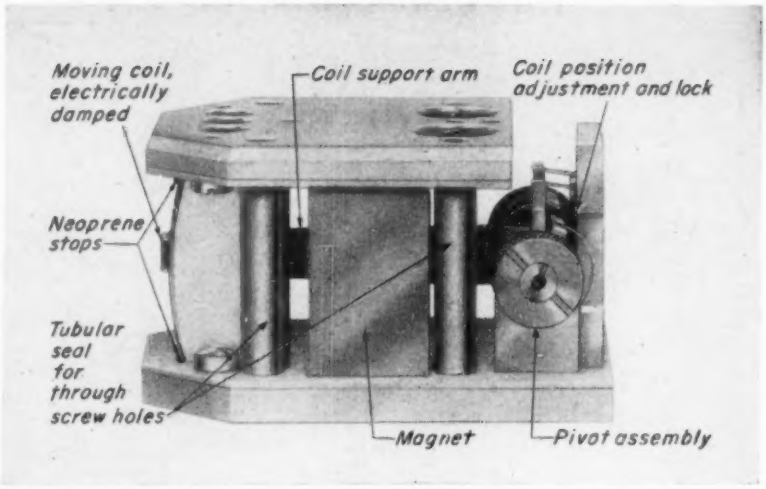

SENSITIVE MB PICK-UP is used for measurement in studies of vibration problems.

pronounced as jet engines and their rotating masses become larger.

Another problem peculiar to turboprop engine installations is that the engine is mounted concentrically within a cooling shroud. The cooling air space between engine and shroud must remain fairly constant all the way around the engine, says MB, or hot spots develop on the engine on the "thin" side, and as the gap grows on the opposite side, aerodynamic inefficiencies are introduced.

Result is that the mount manufacturer must provide a vibration isolator that is both flexible yet rigid, or, as Unholtz put it, "we must design a unit with 'controlled flexibility.'"

▶**Precision Centering**—A further design stickler stems from a jet engine's long fore-and-aft dimensions. Any slight angular displacements of the powerplant result in large translational movements of the engine's extremities. Yet the intake end must not be too mobile because of cowling considerations, which cannot tolerate much engine movement. Motion at the exhaust end must also be kept to a minimum.

Because of these severe restrictions on engine movement, Unholtz says that turboprop vibration isolators must be engineered "to make the coincidence of the elastic center of the suspension and the center of gravity of the engine-propeller system with much greater precision than was necessary with piston engines whose shape and mounting allowed much more tolerance in this respect."

▶**Temperature Problem**—The jet engine's much-higher operating temperature is another headache for the mount manufacturer. Unholtz estimates that turbojet engine mounts have to withstand temperatures about double those of a piston engine. He adds that this is still a wide open problem. If temperatures at the vibration isolators exceed the limits for natural rubber, provisions will have to be made to cool the mounts with ram air.

Temperature surges after engine shutdown may be handled in two ways: over-cool the mounts continuously during flight to control the surge maximum temperature; or provide adequate engine compartment ventilation by gravity airflow at shutdown.

▶**Single & Dual Plane**—MB officials say another problem is the trend of turboprop engine manufacturers toward using dual plane mounting for their newer powerplants. Dual mounting points make it impossible to design standardized vibration isolators for any given model of engine, because each different airframe manufacturer (or even one manufacturer on two different models of aircraft) provides the mount maker with a different structural attachment for the engine fore and aft, requiring tailor-made mounts.

On a reciprocating engine, the ring-type engine bearer provides standardized engine mount attachment points for any given type of powerplant regardless of who makes the aircraft.

The T34 turboprop is an exception to the rule, having a ring-type mount, similar to that of a piston radial engine, and thus allows standardization.

▶**Mounts for Turbojets**—As turbojets become larger and more powerful and the operating period between engine overhauls is lengthened, the unbalance of the rotating mass must inevitably increase unless even more time and effort is spent to balance the unit, Unholtz says.

And to keep blade tips in the subsonic region, compressors and turbines will have to turn more slowly as they get larger. As in the case of the turboprop, this induces vibration of lower frequencies. As these vibration frequencies become lower, they approach the natural mode frequencies of the

aircraft's structure. Result: vibration is transmitted from the engine throughout the entire airframe, instead of being localized in areas adjacent to the engine as is the case when frequencies are high.

Noise transmission to airframes can be serious. Pilots may refuse to fly their aircraft because normal sound is misinterpreted to signify incipient engine failure. Also, in commercial aircraft, passenger comfort is dependent upon confining the engine disturbance locally at the engine.

▶ **No Strain**—Another point MB makes in favor of using flexible engine mounts with turbojet powerplants is this: They could effectively prevent fuselage stresses (such as bending caused by maneuver loads in a fighter where the engine is buried in the plane's structure) from being transmitted to the engine.

Such devices as ball and slip joints which are currently used to avoid such stress transmission could be eliminated, using the space and weight for vibration isolation and at the same time avoiding the use of metallic bearings which might wear or freeze, MB believes. The engine mounts would, in effect, accomplish the dual purpose of vibration isolation and stress removal.

The reverse is also true. Flexible engine mounts would allow the powerplant to go through thermal expansion and contraction without imposing damaging engine stresses on the plane's fuselage.

Here again, as with turboprop installations, space and heat considerations will create further hurdles for MB engineers to overcome.

▶ **Other Applications**—The company makes vibration isolators for applications other than engine mounting. For instance:

• **Avionic equipment.** MB's Type 121 isolator is used to mount radar antennas and airborne avionic assemblies. It possesses equal stiffness in all directions and has builtin, three-directional damper. Its buildup is less than 3.5 to 1 at resonance in any direction. The damper is entirely enclosed. Load range is from 15 to 100 lb. and the isolator performs satisfactorily from −40 F. to +175 F. The unit passes MIL-E-5272A on vibration and shock tests.

• **Containers.** Type 19S20 container mounting, for vibration and shock isolation for aircraft engines packaged in shipping containers, is used with P&WA R4360 engines. Types 1812D83 and 1812R83 are used with the R4360, as well as the R2800 and T34 powerplants.

• **Accessories.** MB's Type 5 mount, with equal stiffness in three mutually perpendicular directions, is used for accessory aircraft equipment weighing several hundred pounds or more, such

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as oil tanks and camera equipment. Another similar mount is the Type 17, which is used for accessory equipment weighing less than 200 lb.

Excitation

Another avenue in MB's three-way approach to the secrets of vibration behavior is the study of vibration excitation.

MB manufactures a whole family of vibration exciters. They range from the Model C7 (specifically designed for production vibration testing of subminiature vacuum tubes) with a range of 100-10,000 cps. and a continuous duty generated vibratory force of 1.3 lb., through such machines as the S6 (0.5-500-cps. frequency range and 150-lb. generated vibratory force), and the C25H (3-2,000-cps. frequency range and 3,500-lb. generated vibratory force), to the C100, with a 3-2,000-cps. frequency range and a generated vibratory force of 12,500 lb.

MB describes the C100 as "the first general-purpose vibration generator of this capacity ever built."

► **Tests Missiles**—Important new application of MB's vibration exciters is for testing missiles. Exciters are large and powerful enough so that completely assembled missile may be tested as a unit.

Among manufacturers using MB exciters for missile testing purposes is Bell Aircraft Corp., which uses it to test the Rascal missile. Bell says that "this (vibration) testing is necessary because experience has shown that one of the primary causes of missile malfunction is shock and vibration during transportation, launching and flight."

Bell says that MB equipment was also used to test the Bell X-1A.

Other missile manufacturers or flight test centers which have or are purchasing MB exciters include Aerojet General, Convair (San Diego), Hughes Aircraft, Fairchild Guided Missiles Div., White Sands Proving Grounds, Redstone Arsenal, General Electric and Raytheon Manufacturing Co.

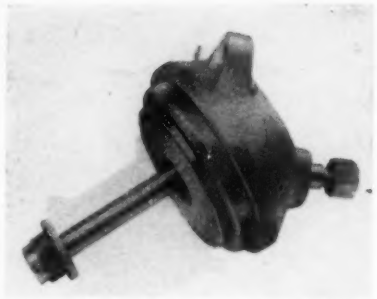
► **Aircraft Applications**—Unholtz cites these as typical aircraft applications for vibration exciters:

• **Environmental testing.** Accessory or component is vibrated through an amplitude and frequency spectrum designed to duplicate the conditions of actual service. The item under test is checked for malfunctioning or damage resulting from the application of vibration. Studies are conducted through a range of temperature, relative humidity, and atmospheric pressure corresponding to the various operational conditions of the aircraft.

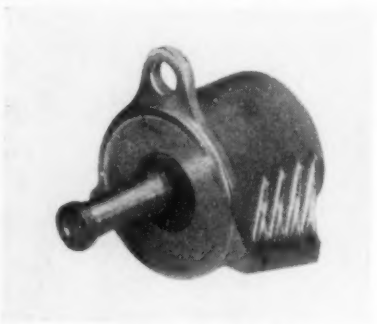
• **Testing the whole.** Complete pilotless aircraft or missile assembly is forced to vibrate through a range of amplitude and frequency to uncover malfunctions of complete systems (such as the guidance system) and other automatic controls. These tests are sometimes used as production checks.

• **Aeroelastic studies.** Aeroelastic studies of complete aircraft may be performed. Vibration exciters are attached to the plane's structure in order to introduce vibratory forces to determine the natural mode forms and frequencies of the aircraft wings and control surfaces. These natural modes correspond to zero airspeed flutter modes and serve to check experimentally the calculations for the aeroelastic stability of the aircraft. In addition to the mode form and frequency, the structural damping associated with each of the natural modes may be determined.

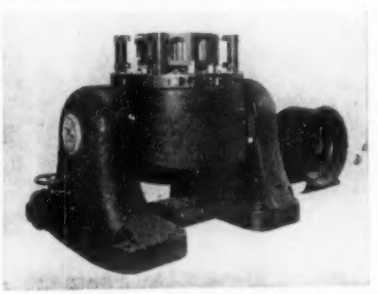
• **System calibration.** Vibration measuring systems may be calibrated. Such systems, consisting of a vibration pick-up and associated recording equipment, may be calibrated in the laboratory using the vibration exciter. Calibration is necessary to insure accuracy in data obtained from flight test records or telemetered information.



PEDESTAL mount for P&WA R2800C.



VIBRATION isolator for T34 engine.



C-100 exciter produces 12,500 lb. force.

► **Big C-100**—Latest and largest in MB's family of vibration exciters is the C-100, a massive, electrically operated, 7-ton machine which is being built for GE, Westinghouse Electric, Walter Kidde & Co., Philco Radio and Bell Aircraft.

Three components make up the entire system—the vibration exciter, power supply and control panel.

The vibrator, which incorporates all major improvements developed by MB during its years in the vibration testing field, has a total stroke of ½ in., produces a continuous rated force output of over 12,500 lb. over a frequency range of 3-2,000 cps. Machine is capable of accelerations up to 20G with a load of 360 lb. on the table; to 10G with 985 lb. on the table. Table size is 27 in., its motion sinusoidal. Trunnion-mounted body allows easy adjustment from vertical to horizontal operation.

MB says four specially-designed table flexure supports with an overall stiffness of approximately 9,000 lb./in. permit heavy loads to be placed on the table yet insure straight-line table motion. Over-travel switches are provided to prevent the exciter from exceeding its rated stroke.

Power supply is designed to provide full rated output with a minimum of distortion. Switching from one alternator to another does not require shutting down the motor-alternator set.

Control panel, the third component of the vibration exciter package, houses all the operation controls. Included are a running time meter and a plug-in jack for feeding into an oscilloscope. Complete electrical interlocks prevent mis-operation of the unit and preclude the possibility of mis-starting the equipment.

A signal generator attached directly to the table is calibrated to give direct readings of table acceleration, velocity, or displacement on a vibration meter mounted in the control panel. Blowers provide cooling for those components requiring it.

Measurement

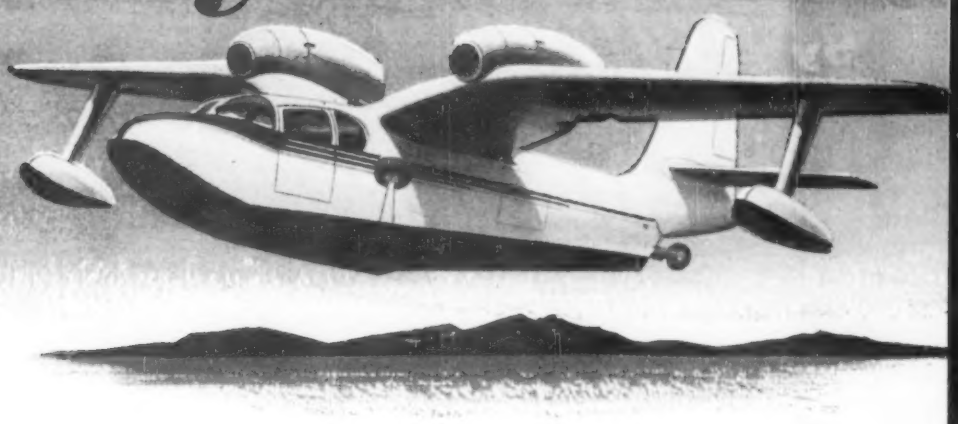
To round out its line of vibration equipment, MB manufactures a series of 12 vibration pick-ups for various applications such as low-frequency studies, general-purpose laboratory use, and to measure initial shock wave velocities.

► **Sensitive & Rugged**—MB says the principal characteristics of its line of vibration pick-ups are constant calibration, sensitivity and ruggedness.

Low friction in the pivot assembly of the units allows the pick-ups to operate under conditions of low frequency and low amplitude without amplitude or wave form distortion.

Extreme lightness of the coil and

Announcing- the Royal Gull



an all-new, twin-engine gull-wing amphibian

Eleven Royal Gulls destined for military use with the Italian Air Force. These planes have been in rugged military service with the I.A.F. for more than three years without interruption in operations from any cause. They were built by the world famous Piaggio & C. plant at Genoa, Italy.

PERFORMANCE DATA AND SPECIFICATIONS

DIMENSIONS AND WEIGHTS

Overall length	35'6"
Wingspan	44'5"
Height	11'6"
Wing area	268 sq. ft.
Empty weight	3900 lbs.
Max. useful load	1940 lbs.
Gross Weight	5840 lbs.

POWER PLANT

Two Lycoming GO-435-C2B ..... 260 hp ea.*

Propellers: Hartzell, three blade, variable pitch, constant speed, full feathering

Fuel capacity ..... 190 gal.

All-metal, monocoque construction.

*Optional—Two Lycoming GO-480 (270 hp) engines. Performance ratings increase proportionately.

PERFORMANCE

Maximum speed (at sea level)	approx. 180 mph
Cruising range	over seven (7) hrs. with reserve
Cruising speed (at 7000 ft. and 72% power)	approx. 160 mph
Climb to 3000 ft.	3 min., 2 sec.
Service Ceiling (both engines)	18,000 ft.
Service ceiling (one engine)	over 5,000 ft.
Take-off run, land	787 ft.
Landing run, land	722 ft.
Time for take-off from water (no wind)	18 sec.

HERE'S a working ship that's specially designed for the man who's going places. Be he air-minded executive, aerial surveyor or company pilot, he'll go "sky-wide and handsome" in the exciting new Royal Gull.

If you're that man, this amphibian puts new, more useful wings at your command . . . provides convenience unobtainable in any other type of aircraft. Go when you want . . . at speeds approaching three miles per minute. Fly where you will . . . in 5-place executive comfort up to a thousand miles or more. And land where you please . . . any airport, lake or river can be your landing field.

Learn more about this new concept in utility and convenience. Write on company letterhead for your copy of the 8-page brochure on the Royal Gull.

A real record breaker . . . the Royal Gull, piloted by a woman, recently set a world's distance record for amphibians in its class . . . 1865 miles non-stop.

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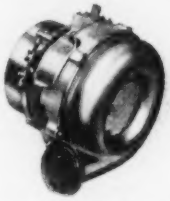
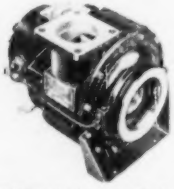
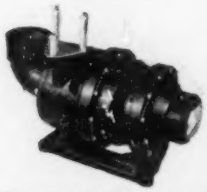


Air-Turbine Starters

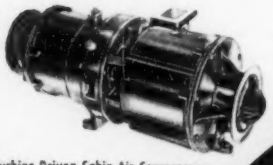


Turbine-Driven Fuel or Water-Alcohol Pumps



Turbine-Driven Ram-Jet Fuel Pumps

plus many other turbine-driven accessories



Turbine-Driven Cabin Air Compressors

Have you considered the advantages of driving your air frame and engine accessories by air?

Compared to other existing drive systems, Eclipse-Pioneer Air-Turbine-Driven units . . . including constant-speed drives . . . cost less and save up to 50% in weight. As desired, they can be supplied for mounting directly on the engine or at some remote location to suit space limitations. Relative simplicity of design permits replacement in minutes, and faster and cheaper overhaul.

E-P's air-turbine program is complete and covers a wide variety of functions, including ram air and engine-bleed, air-driven applications. And even as the most advanced units roll off the production line, research and development continue with vigor . . . investigating the practicability of bleed and burn systems . . . improving on limits of speed control . . . producing greater output in smaller packages.

With close to 40 years of specialized aviation accessory experience, we *know* the accessory business. And because we *know* accessories, we design and build our turbine drives with accessory requirements always firmly in mind.

Whether your requirements call for an accessory with integral air-turbine drive, or an air-turbine drive by itself, E-P can suit your needs precisely. Write today for further information and for illustrated brochure, "Air-Turbine Facility".

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pivot assembly allows the unit to withstand severe vibration without damage. Impact shocks as high as 3,000G have been successfully applied.

The device is normally used as a seismic instrument, according to MB. It generates a voltage proportional to the velocity of the vibrational component perpendicular to its base. This voltage is generated by the motion of a small coil mounted on the end of a pivoted shaft. The coil is free to move in a magnetic field created by two Alnico magnets. Internal electrical damping of the coil of some pick-ups assures a high degree of calibration stability under conditions of varying temperature. Neoprene stops are also provided for the coil.

Vertical and horizontal pick-ups are identical and can be readily converted to measure in either field. External, adjustable nameplate tells in which field the pick-up is to operate. MB also furnishes portable and battery-operated vibration meters which are used with the pick-ups for measuring steady-state vibratory acceleration and velocity.

▶ **Company Background**—MB Manufacturing Co., Inc., was organized in early 1938. First jobs were machining precision parts for Pratt & Whitney Aircraft. Company was started with 12 employes and 3,500 sq. ft. of floor space by two brothers of Swiss descent, Rollin and George Mettler (MB stands for Mettler Bros.).

Currently, MB employs 700 persons, occupies 78,000 sq. ft. of floor space and does a $9-million yearly business.

MB was recently bought from the Mettler brothers by Textron, Inc. This gives the company a broader borrowing base and stronger financial structure, officials say.

PAA Uses Simulator For Fire Training

An electrical device which activates an aircraft fire-warning circuit to simulate emergency conditions is being used by Pan American World Airways to sharpen its crews' proficiency in fire-fighting procedures. The system costs about $20 to assemble.

Before a training flight the device is plugged into the plane's fire-warning system. During flight, the instructor may select and energize a powerplant alarm system to check the crew on its response in an emergency.

The simulator operates independently of the regular alarm system and, as a result, the crew is unable to determine in advance if the emergency is real or only a test. Warning lights on the training aid indicate, however, existence of a real fire.

The portable test unit has been operated in PAA's Stratocruisers and DC-6Bs.

Fuel Pump Designed For High-Altitude Use

Burbank, Calif.—Hydro-Aire, Inc., has received limited production contracts for both aircraft and missile applications of its new "HY-V/L" fuel booster pumps, designed for maximum efficiency at high altitudes. The pump is going into the Chance Vought Regulus missile and the McDonnell F-101 fighter.

Unlike many boost pumps, the new Hydro-Aire pump does not depend upon a separation of vapor from fuel to eliminate the problem of high-altitude boiling.

Instead, a new impeller design forces the vapor back into the liquid and dissolves it with an action which the company says creates a minimum of disturbance in the boiling liquid and produces a solid stream of fuel at the pump outlet.

Testing has proven the ability of the new pumps to handle high vapor-liquid ratios during fast rates of climb and very-high-altitude flying, the firm reports.

Hydro-Aire says tests with prototype and production units showed:

- In all tests with aviation gasoline and jet fuels, the pump proved its ability to recover after an electric power failure at altitudes as high as 70,000 ft.
- The unit operated satisfactorily with both hot aviation gasoline and jet fuels while following climb rates far in excess of known requirements.
- When the pump inlet became uncovered for a short period of time, the pump showed immediate recovery as soon as the inlet was again covered with fuel, at altitudes as high as 65,000 ft.

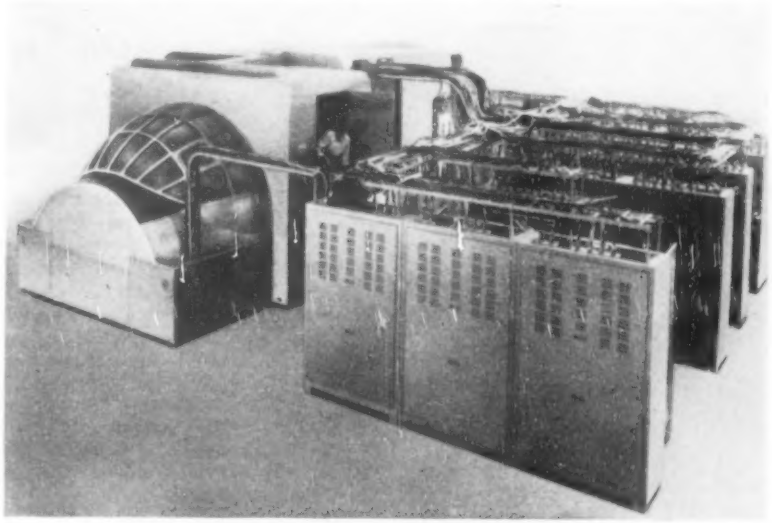
The new impeller design is a conical screw—a cone-shaped spiral of decreasing width. It is said to eliminate collection of vapor on the vanes and result in a uniform fuel velocity from inlet to outlet. The design was the result of a year's study of various impeller designs.

According to Hydro-Aire, the new principle eliminates excessive power requirements.

In one application the pump has been combined with a new turbine developed by Hydro-Aire to produce a unit design to fill the demand for turbine-driven fuel pump packages for both missiles and aircraft.

The firm says this pump exceeds specified weight flow and head requirements at all stipulated flight conditions and altitudes. The turbine, requiring no controls, performs under full compressor bleed pressure, limiting its own flow rate aerodynamically.

The unit is designed for dry run operation at full runaway speed of 24,000 rpm. for 30-min. intervals. Bearings can operate without replacement or servicing during the rated lifetime of 1,200 performance hours, the company says. First application will be on the C-133.



Air Force's New B-36 Simulator

First two of a series of flight simulators for mammoth, 10-engine, B-36 aircraft have been delivered to USAF by the Electronics Division of Curtiss-Wright Corp. They went to Fairchild AFB, Spokane, and Carswell AFB, Fort Worth. The simulators contain 2,600,000 ft. (500 miles) of wire, 1,200 vacuum tubes, 800 potentiometers and 250 servomechanisms. An area of 40x40x14 ft. is needed to house the trainer. The simulator incorporates a ten-to-one switch which accelerates fuel depletion rate so long flights can be synthetically shortened, compressing a full day's operation into 2½ hours.

CAA Permits Use Of Oil Additive

Spotoil, an oil additive that is supposed to decrease engine wear, reduce oil consumption and temperature, and cut down on lead and sludge, has gained Civil Aeronautics Authority approval for use in Pratt & Whitney Aircraft R2800-75s and for service evaluation in other engines.

Pratt & Whitney, however, has withheld approval of the additive because it displayed "corrosive tendencies" in laboratory tests. Although a P&W representative found no significant corrosion in an R2800-75 after 1,000-hr. teardown, the company is worried about the effects of high concentrations of the fluid. P&W says: "We cannot accept the principle of the use of additives with concentrations controlled by line personnel."

Spotoil is described by its manufacturer, Spotoil International Sales Corp., Washington National Airport, Washington, D. C., as a "blend of highly refined, neutralized mineral oils and certain concentrated derivatives of petroleum."

The test on which CAA based its approval—in the form of a "no objection" letter—was 1,000-hr. operation in one engine of a C-46 operated by Westair Transport. The CAA study included a check of the operational and maintenance reports of the test engine and inspection of the disassembled test and control engines. The manufacturer states that Spotoil has been tried in "hundreds of other aircraft engines, ranging from C65s to 1820s," all with good results.

Spotoil reports the "no objection" letter is the first issued by CAA for a supplemental lubricant or additive.

CAA's permission, subject to two conditions, is for use of Spotoil in the R2800-75s or other P&WA engines of lower power, for engines of medium- and low-powered aircraft, and for service evaluation tests in any other engines used in airline operations. The conditions: ratio of no more than one part Spotoil to nine parts regular oil, and no use of detergent until evaluation tests substantiate such use.

Spotoil's president, I. H. Mansfield, reports laboratory tests indicate the addition of 10 to 20% of his product to a regular lubricant will increase the oil's viscosity index, reduce its pour point, increase its penetration and extreme pressure qualities, and dissolve carbon without detergent action.

Mansfield claims Spotoil will increase horsepower output per engine, declaring that in dynamometer tests on automotive engines, Spotoil has increased torque horsepower output by a minimum of 1% per cylinder. He also says Spotoil reduces maintenance of an engine involving stuck rings and valves. "We have never had a stuck ring or valve in any piece of equipment that used Spotoil," Mansfield says.

UAL Corrects 340 Cabin Window Defects

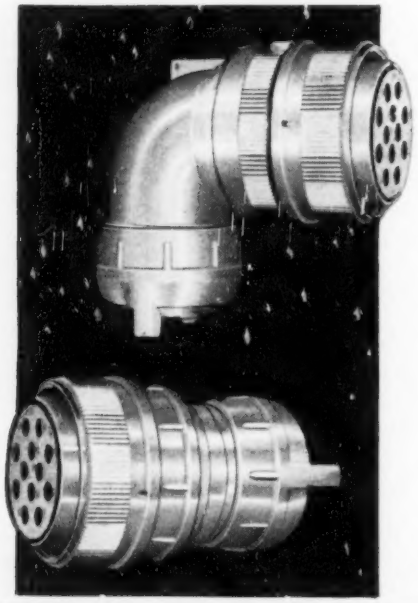
United Air Lines has replaced all cabin windows in its Convair 340s because of shearing of the vinyl sandwich between the two plate glass layers, forcing shutdown of the pressure system.

The fleetwide 340 window replacement was completed July 23, AVIATION WEEK learned, following discovery of the condition July 8.

Principal modification to the windows, made by Pittsburgh Plate Glass Co., was to thicken a metal insert around each pane by approximately three-eighths in. and extend it up between the two pieces of glass.

The airline says it has devised a new installation procedure that allows the windows to "float," permitting expansion and contraction due to pressurization. Weight difference between the new and the previous installation is said to negligible.

Now! BENDIX·SCINFLEX waterproof plugs



for use with multi-conductor cables

These new Bendix*-Scinflex *waterproof* plugs are a modification of our standard AN type "E" (environment resistant) connector. They are designed to meet all "E" performance requirements when used with multi-conductor cables. Each plug includes a modified AN3057B cable clamp which provides inward radial compression on multi-conductor cables. This unique feature completely eliminates cable strain—a common source of circuit trouble.

In addition, there are gaskets at all mating surfaces and an accessory sleeve is available to accommodate an extreme range of cable sizes. A folder describing this new waterproof plug—and the various sizes in which it is manufactured—may be obtained by writing our Sales Department.

*REG. TRADE-MARK

THESE BUILT-IN FEATURES ASSURE TOP PROTECTION AGAINST CIRCUIT FAILURE:

Shock and Vibration Resistant

Die Cast Aluminum Shell

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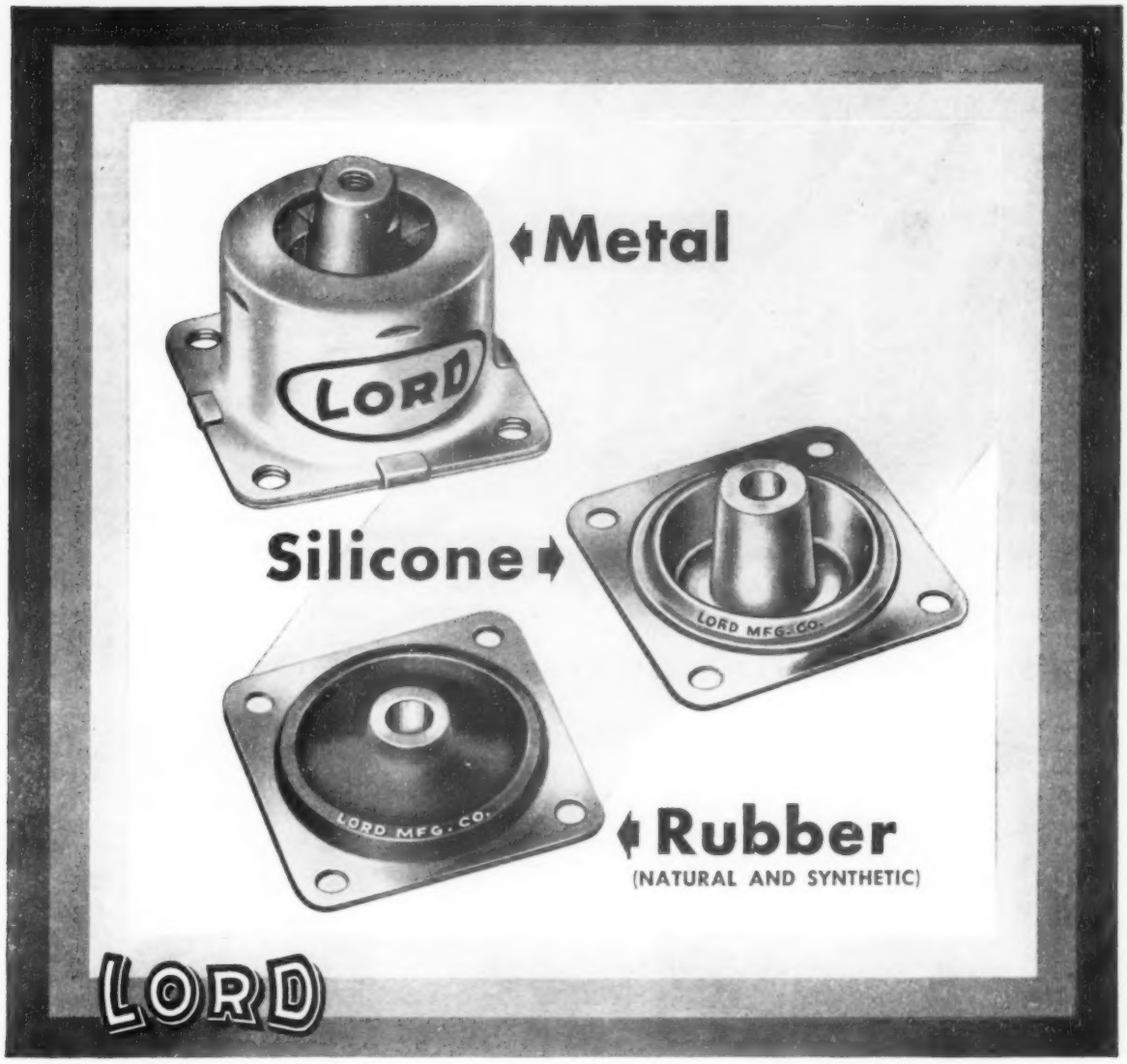

Recommends Materials Best Adapted to your Vibration Control Requirements

Metal—Natural Rubber—Silicone—Neoprene—Buna S—Buna N—and others are selected by LORD Engineers to satisfy your specific environmental conditions and assure the most economical solution of your vibration control problem.

LORD research is constantly developing and evaluating new materials and processes to insure that the most complete line of vibration control mountings is at your disposal.

Over 27,000 basic designs and their variations are already available from which to choose.

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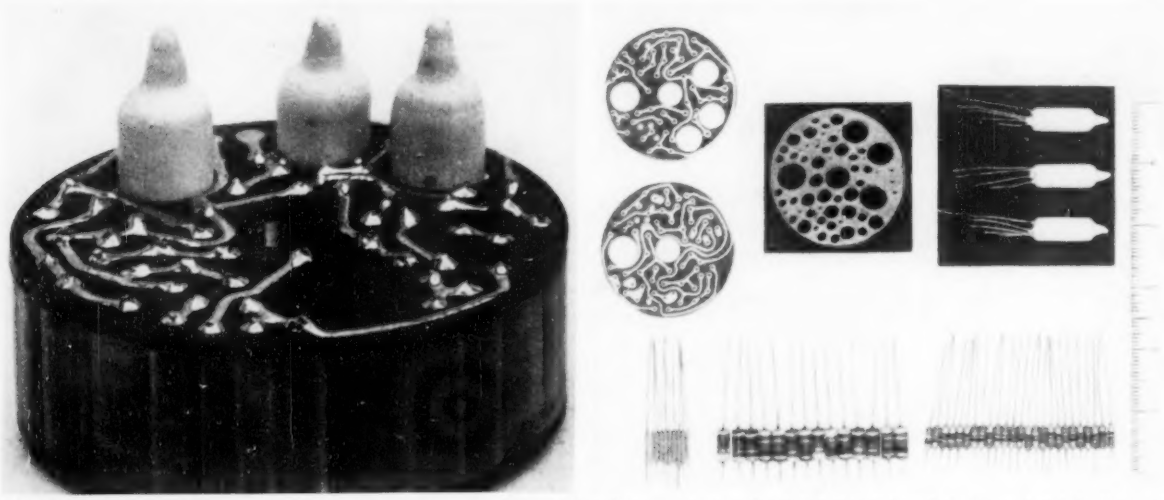
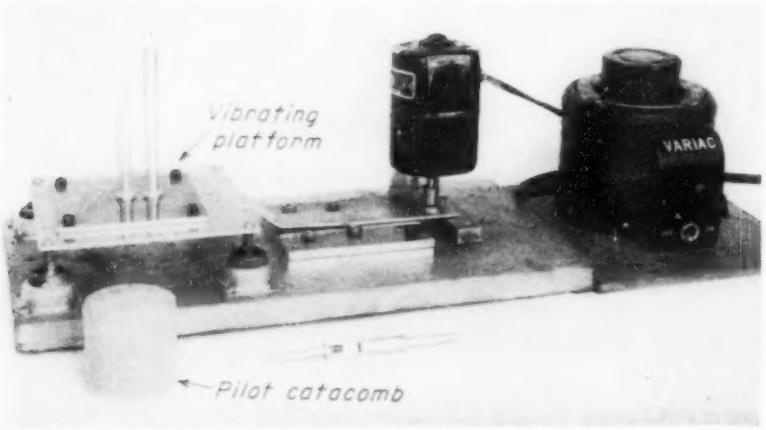
Headquarters for **VIBRATION CONTROL**

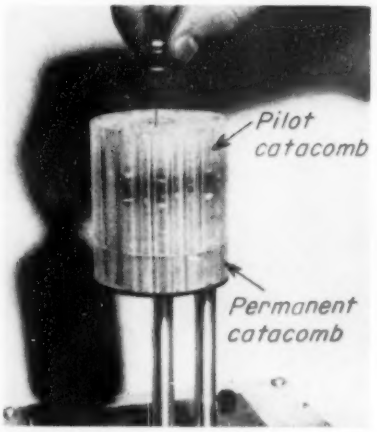


MECHANIZED ASSEMBLY of electronic devices (l.), using conventional components and printed circuit boards (r.), speeds fabrication, yet does not require elaborate or expensive machinery. Technique was developed by Frankford Arsenal.

Mechanization Speeds Avionic Assembly

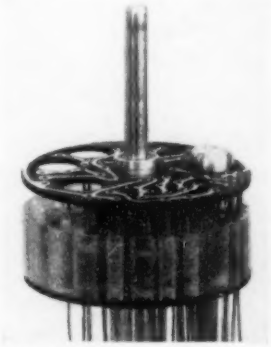


INEXPENSIVE VIBRATOR is the only machine required for small production runs. However, the same technique appears suited to full mechanization for large-scale production.

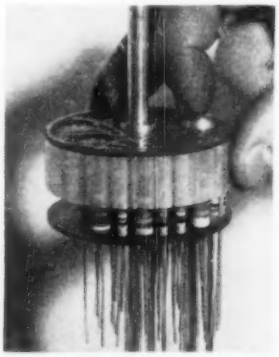


COMPONENTS are dropped into plastic catacombs atop printed circuit end plate.

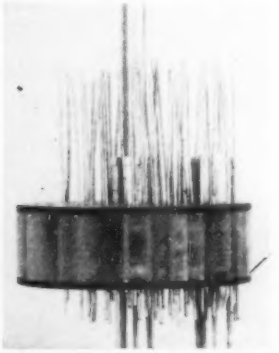
VIBRATION drops component leads into end-plate holes. Then pilot catacomb is removed.



TOP PLATE, with printed circuit, is next added and secured to the supporting shafts.



CATACOMB is lifted flush with upper plate after which entire assembly is inverted.



VIBRATION drops leads into bottom plate holes. Unit is now ready for dip soldering.

Efficient small-quantity production of avionics equipment, despite frequent design changes, may find a useful tool in a new mechanized assembly technique. The novel process, for speeding mounting of conventional electronic components onto printed-circuit boards, requires only a simple, inexpensive machine for pilot-line production.

Developed by Frankford Arsenal's Sgt. James E. Huggins, Jr., under Army Ordnance sponsorship, the new technique, shown on the opposite page, is approximately six times faster than conventional hand-wired construction, its inventor says. With more elaborate machinery, including automatic feed hoppers, the process would be up to 36 times speedier, he estimates. Frankford Arsenal is using the technique to build equipment of an undisclosed nature.

▶ **3-D Sandwich Construction** – The new process employs a three-dimensional sandwich-type construction in which resistors and capacitors, enclosed in a plastic catacomb, are mounted vertically between two printed-circuit end plates and connected to them by dip soldering (photo, opposite page, top left).

By stacking two or more of these modules, any required degree of circuit complexity can be obtained. Among advantages of this type of construction:

• **More compact** than conventional 2-D construction(where component body is placed lengthwise against a single printed-circuit board).

• **No bending of component leads** (at right angles to component body), as is required with the General Electric and Stanford Research Institute mechanized assembly process (AVIATION WEEK Mar. 8, p. 42). This reduces chance of damaging component and simplifies the design of automatic feed hoppers.

• **Strong, rugged unit** results from sandwich-type construction.

▶ **Shake Into Place**–Key to Huggins' new process is a plastic catacomb into which all tubular components are dropped (by hand or by automatic hopper), and a vibration mechanism which shakes the assembly with a circular motion in the horizontal plane until component leads fall through holes punched in the printed-circuit end-plate. This occurs in less than five seconds, for several dozen components, providing their leads are reasonably straight, Huggins says.

However, Huggins emphasizes that there is no stringent requirement on component lead straightness. Examination of the accompanying photographs appears to confirm this statement. The holes in the end-plates need be only 0.010 and 0.015 in. larger than the biggest component lead diameter, he reports.

Vibration can be supplied manually or by means of a small motor driven platform, for pilot-line production. In the case of fully mechanized assembly, more elaborate equipment would be needed.

▶ **Drop, Shake, Invert, Dip**–Here are the major steps in the new process (see photos, left):

• **Printed circuit end-plate,** permanent plastic catacomb, and pilot catacomb (which are identical except for length) are positioned on two shafts attached to the vibration platform. The shafts serve to orient the catacombs and end-plate. Individual components, with one of their two leads clipped short, are dropped into appropriate holes in the catacombs.

• **Component leads drop through holes** in lower end-plate after initial vibration, and the pilot catacomb is then removed.

• **Second end-plate is positioned** atop the two shafts, resting on the component leads, and is secured to one shaft. The catacomb is then raised flush against the top plate which restricts each component lead to the proximity of its hole in the upper plate. The entire assembly is then removed, inverted, and replaced on the supporting shafts.

• **Final vibration** causes component leads to drop into holes in the (now) lower plates. The entire assembly is then removed and the lower plate is dip-soldered. Tubes are then manually inserted (through appropriate holes in the lower plate) so their pins fit into holes in the upper plate, which is then dip-soldered. Component leads are then clipped flush with the end-plates.

Where interconnections are required between printed circuits on the two end-plates, wires with small plastic sleeves (to prevent their slipping through end-plate holes) are dropped into the catacomb just like resistors and capacitors.

▶ **Easy to Change Circuit**–When a design change in assembly circuitry is required, it is only necessary to make up new end-plates and possibly new catacombs. No change is required in the machines, Huggins points out. It is even possible to build the assembly without a permanent catacomb, if desired, further simplifying design changes.

Although the process has not been carried beyond the present experi-

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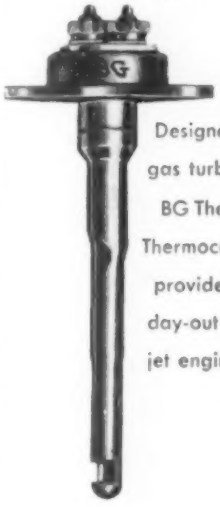

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Precision-tooled and manufactured to fit *all* types of aircraft engines, BG Spark Plugs meet the most diversified operating requirements and the highest mechanical specifications.

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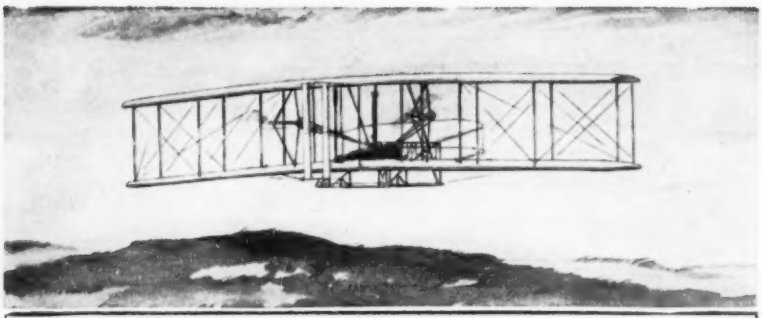

$$F = C\frac{\rho}{2}SV^2$$

IN 1903, when the Wright Brothers were constructing the first successful powered airplane, there was data available on the forces on flat plates held at various angles in the wind. The problem of maintaining equilibrium presented the greatest difficulty of solution. The Wright Brothers had to depend on ingenuity, perserverance, courage and a home-made wind tunnel for solutions to their problems.

TODAY, IN 1954, aircraft development and production depend on the scientific skill of highly trained Engineers. During the past 50 years these Engineers have evolved countless formulae, such as the *Force-In-Pounds* equation above, to help provide simple solutions to aeronautical problems which once seemed insurmountable.

IN THE YEARS AHEAD, sub-sonic, trans-sonic and super-sonic problems will give way to hyper-sonic inquiries as new and greater opportunities challenge Aeronautical Engineers. If progress is to be made, new ideas are needed. New formulae must conquer problems of stress, space, loads and high speeds.

TO MEET THIS CHALLENGE, CONVAIR needs more Engineers with ingenuity. To get the job done will require concentrated and creative engineering. CONVAIR has the experience, record of past performance, leadership, determination and facilities to do the job.

OPPORTUNITIES ARE UNLIMITED at CONVAIR for high caliber creative Engineers. If you have confidence in your ability to help create tomorrow's aircraft, inquire now about these excellent opportunities . . . permanent positions . . . ideal working conditions and living environment in FORT WORTH, TEXAS.

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mental stage, Huggins says that thought has been given to full mechanization. For instance, automatic one-shot loading of all components could be accomplished by gravity feed through hopper tubes. These could be connected to a master catacomb which could be positioned above the pilot catacomb for loading.

Instead of removing the assembly and inverting it manually when the second end plate is added, the entire vibrating mechanism could be inverted. Transformers and chokes could be made in tubular shapes to permit their automatic installation.

▶ **Patent Application**—Army Ordnance, which financed the new development, is considering filing a patent application on it, Huggins said. If granted, the government undoubtedly will retain patent rights enabling defense contractors to use the process without royalty. Huggins hopes to get the commercial rights.

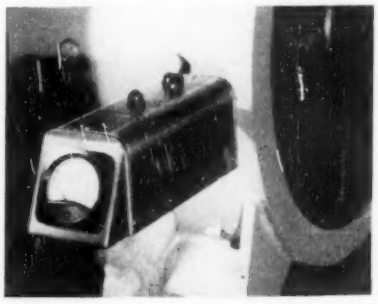
A graduate mechanical engineer from Ohio State, Huggins expects to complete his Army hitch this month and go into industry. Further information on the new technique may be obtained by writing: James E. Huggins, Jr., 6333 Gillespie St., Philadelphia 35, Pa.

—Philip Klass

Portable Meter Reads Vibrations

A new portable, direct-reading vibration meter, capable of measuring both displacement and acceleration, is one of several recently announced devices for instrumentation and test.

The new Type VHA vibration meter, developed by General Electric's Meter and Instrument department (Schenectady), measures over a frequency range of 10-250 cps., accelerations up to 10G in six ranges, and peak-to-peak displacements up to 300 mils in five ranges. Unit contains a barium titanate transducer whose output is amplified and applied to the indicator.



The instrument is equipped with a pistol grip and trigger switch. Weight: 5 lb.; dimensions: 4x8x13¾ in.

Other new instrumentation:

• **Dual channel recorder,** pen-writing, can be easily shifted to any one of six

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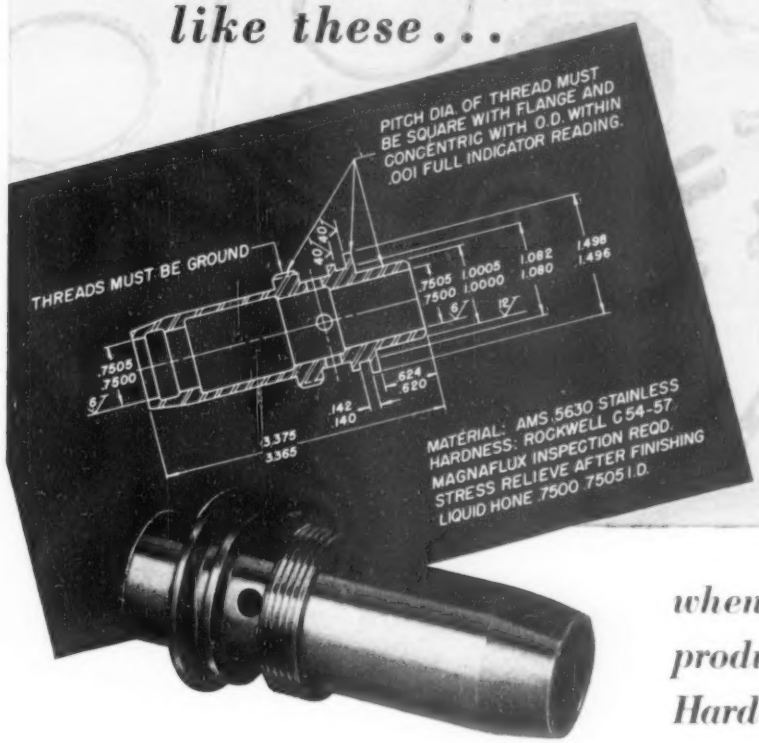

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A New 16-Page Brochure describes and pictures in detail the facilities of Plant 3, where Allied produces precision hardened and ground parts. Included is a complete listing of all equipment in use. A copy will be sent you immediately upon request—without obligation, of course.

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Aerial view of nation's biggest integrated aircraft manufacturing plant in Marietta, Georgia.

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B-47 Multi-Jet Bombers on Marietta flight line before joining U.S. Air Force.

The minute you step inside Lockheed's Marietta, Georgia, factory, you are impressed with the overwhelming size—seemingly endless production lines integrating every conceivable facility for making all types of aircraft. This plant is particularly suited for the largest airplanes—bombers, tankers and transports.

The main assembly building covers 47 acres *under one roof*. The final assembly area alone is nearly half a mile long. In this giant structure are the newest automatic machines to form, mill and turn steel, aluminum and heavy alloys. The Onsrud Spar Mills can mill in one operation a 48-foot aluminum alloy plate weighing a full ton into an integrally-stiffened wing panel. Overhead cranes for lifting such huge units are completely radio-controlled.

This bigness saves *you* money because it means more efficient, more economical aircraft production. It provides maximum flexibility in production planning. Consequently, with minimum effort, the Marietta factory can be arranged to handle any design or any type of aircraft, guaranteeing a continuous flow of material from the raw state to the completed airplane. Today, more than 45,000 different parts are being manufactured at Marietta.

That's why the U.S. Air Force selected the Marietta factory to build multi-engined B-47 Jet Bombers and C-130 Turbo-Prop Combat Cargo Planes. In the more than three years under Lockheed management, this Marietta plant has never missed a delivery schedule. And today, new cost and performance records are winning additional commendations from the USAF.

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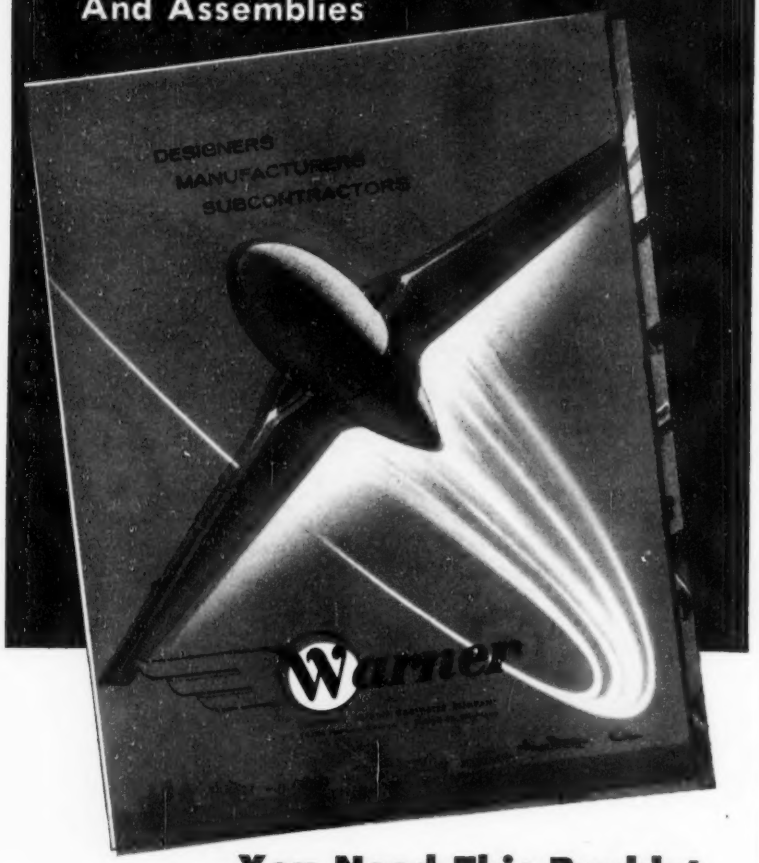

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chart speeds between 2½ and 100 mm./sec. Descriptive bulletin on new Model 8082 can be obtained from Edin Co., Worcester, Mass.

• **Electric camera,** Model DR-2AB, for photographing oscilloscope traces or data panels, on continuous-motion 35-mm. film, has magazine capacity for 100 ft. of daylight-load film or 200 ft. of darkroom-load film.

Electric governor provides choice of three basic speeds (60, 48, and 36 in./sec.) and a mechanical transmission permits eight reduced speeds in each range—48, 24, 12, 6, 3, 1½, and ¾ in./sec. Camera can take single-frame still pictures when triggered from an external control, and provides remote indication of film consumption. Photographic Products Inc., 100 No. Olive St., Anaheim, Calif.

• **Vibraswitch,** Model 1, consists of an accelerometer which actuates a built-in SPDT switch when vibration reaches any predetermined value. Device can be used to flash a warning light or shut off a machine should vibration become excessive. Model has a maximum range of 2G. Switch contacts can handle 5 amp. at 220 v. a.c. Beta Corp., P.O. Box 8625, Richmond 26, Va.

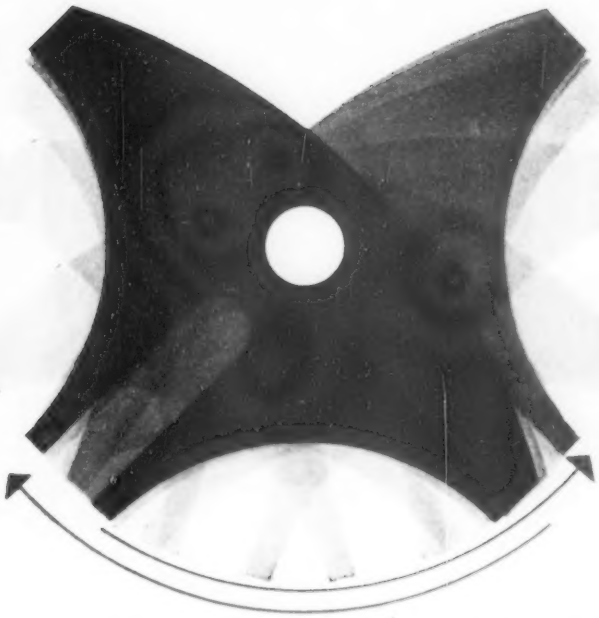
FILTER CENTER

► **Look, No Hands**—New General Electric automatic a.c. generation and control system, which eliminates at least 10 functions previously performed by human pilot, will be used on the Douglas B-66, first production aircraft to be so equipped. New system, which uses magnetic-amplifier voltage regulators, permits automatic synchronization of several alternators. Alternators are high temperature units capable of rated output at 176F at sea level.

► **AF Completes SPAR Test**—USAF's Rome Air Development Center and Air Proving Ground have reportedly completed evaluation tests on new low-cost SPAR (Super Precision Approach Radar) recently announced by Laboratory for Electronics (AVIATION WEEK May 3, p. 54).

► **Win a New Ford**—International Rectifier Corp. will give away a new Ford plus 49 other prizes for new ideas and applications for their selenium diodes. For contest details and entry blanks, write company at this address: 1521 E. Grand Ave., El Segundo, Calif.

► **Millionth Transistor**—Raytheon Mfg. Co. recently produced its millionth junction transistor. Company says that transistor failures in hearing aids are less than 2% per year, a better reliability record than for tubes in the same application. —PK



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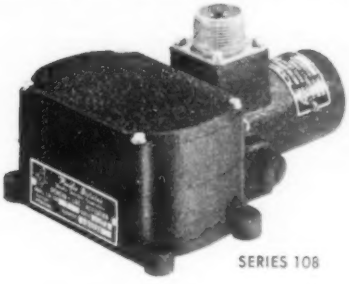

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This is the extremely simple and efficient Bendix-Pacific Geneva-Loc Electric Actuator. These Actuators eliminate the human element. The mechanism positively locks the output shaft at each position while the motor comes up to speed under no load and the varying drive ratio permits power to be applied in a manner best suited for accelerating and decelerating the driven load.

You should investigate the Geneva-Loc Actuator for operating all types of valves, controls and other mechanisms where the positions are predetermined and preferably equally spaced.
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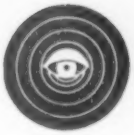

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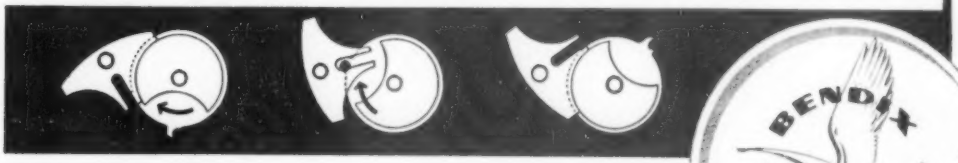

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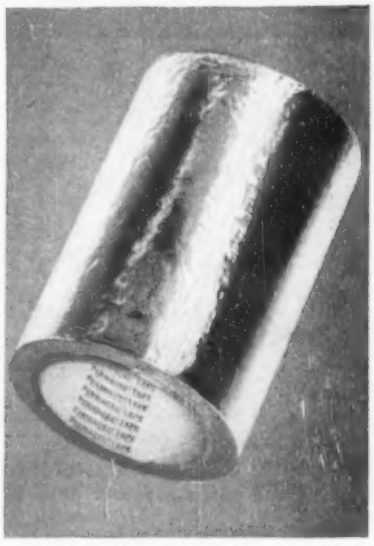

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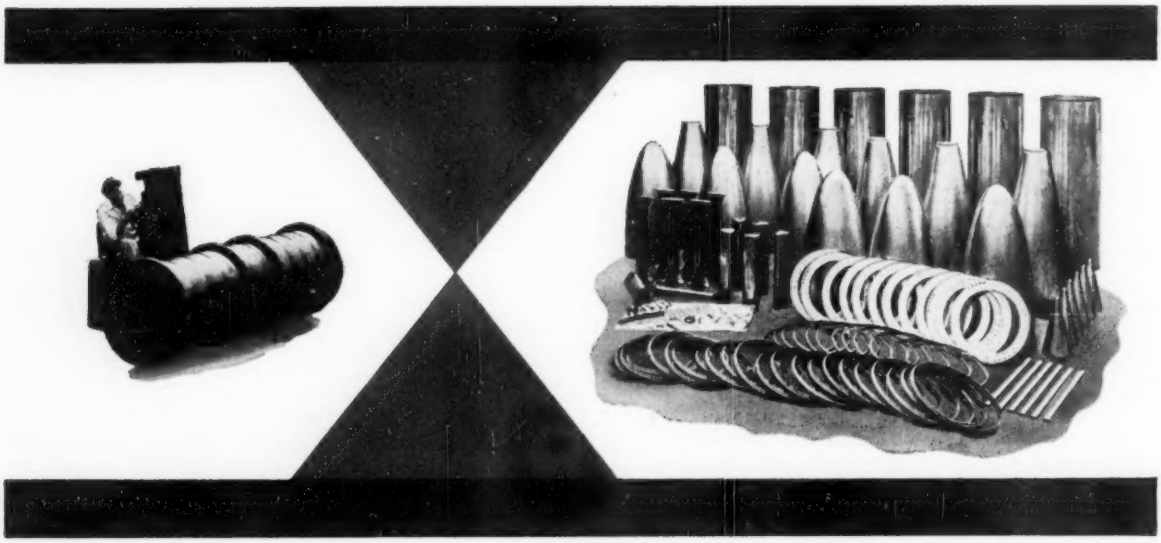

Latest development in jet wing tank production is an unusual new Tank Can designed and manufactured by Royal Jet, Inc. for Type II (high-nesting) jettisonable fuel tanks. This new Tank Can replaces wood crates.

ADVANTAGES:

Royal's Tank Can saves 40% in storage and shipping space, 25% in weight, and 10% in cost against old wood crates. Wing tanks are hermetically sealed in steel — indefinitely preserved.

PROOF:

Spacewise — in the same freight car that once held only 140 high-nesting jet wing tanks, Royal now loads 262 (enough wing tanks for an entire jet fighter group). If these wing tanks were shipped assembled, Royal could pack only 18 to a car.

This economical new Royal Jet container is now standard for the United States Air Force.

Royal Jet needs qualified aeronautical engineers. Write stating qualifications.

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Carriers Like 'Pay-Later' Plans

PanAm, for one, says its travel-on-credit promotion has created $1.5 million new business since May.

Installment selling is rapidly becoming an integral part of airline merchandising.

Pan American World Airways set the trend in motion with its "Pay Later Plan" last May 1. Other airlines soon followed with plans of their own to sell air travel on credit.

The plans now in effect in the industry fall into two main categories:

- One grouping works with the personal finance type organization.
- The second uses consumer credit departments of commercial banks to finance the airline paper.

Adherents of the first category maintain that the finance companies are better geared to handle this type of credit and can expedite transactions on satisfactory risks without undue complication and delay. The supporters of the commercial bank medium assert that interest cost for the customer averages lower than through any other financing medium available.

▶ **Covers the Trip**—In addition to financing the basic air transportation fare, most plans also include the extension of credits for hotel accommodations, sightseeing trips, land transportation offered by tour operators, and related travel expenditures.

One plan (through a bank) provides "unlimited" credit and includes "extra cash-in-pocket for clothing, luggage and shopping."

Extension of credit to finance consumer air travel is not new. But it has been unsuccessful in the past, according to analysts of the subject, because ease of arrangement and ready availability at point of sale were lacking. Further, national promotion was difficult as past plans were unavailable from coast-to-coast on a standard basis.

▶ **PanAm's Plan**—After considerable study of the problem, PanAm evolved an arrangement with Beneficial Management Corp., a personal finance organization operating some 800 offices in the United States and Canada. Beneficial processes the loan applications originated by the airline exactly the same as their own. There is a careful screening and only travel loan applications of "good" credit risks are approved.

A down payment of at least 10% of the total purchase (including the financing charges) is required. The balance can be paid in monthly installments up to 20 months. However, the airline suggests that financing be attempted over a 12-month period. This would permit the customer to return the following year and purchase another trip on credit.

Investigations by Beneficial on Pan American applications are expected to be completed within a maximum of a week and as quickly as 24 hours in many cases. Upon approval of the loan application, Pan American representatives or agents issue all required tickets, exchange, and tour order forms to the customer. The installment notes are payable to Pan American who discount this paper immediately with the Beneficial and the carrier receives the cash price of all travel arrangements relating to the credit. Subsequently, Beneficial will handle all servicing and collection details of the account. The financing charges on this paper are about the same as for other consumer credit accommodations, averaging slightly less than 1% a month. (However, there are variations depending upon the total amount involved.)

Pan American will have to make good to Beneficial on any of its paper which proves uncollectible. The carrier, however, feels that if the average loss experience of Beneficial (about ¾ of 1%) applies to its own paper, this risk will be more than offset by the advantages of the installment plan.

▶ **TWA's System**—Trans World Airlines, effective Aug. 1, announced its travel credit system. TWA discounts its paper with the Pacific Finance Corp., a leading finance company, with offices primarily on the West Coast.

Provision is made for a 2% payment reserve provided by TWA and retained by Pacific Finance against which any losses will be charged. However, as Pacific does not have offices on many of TWA's cities, the carrier will process its own applications through a simplified credit check list procedure developed by the finance company.

The 10% down payment and monthly installments up to 20 months and other features of the Pan American plan also apply to TWA's credit arrangement.

▶ **SAS & Sabena**—Foreign airlines serving the United States market also have credit arrangements with commercial banks for financing travel and related accommodations.

Scandinavian Airlines System has its S-A-S Signature Travel Plan. No down payment is required. The Chemical Bank & Trust Co. in New York and the Bank of America in California through their consumer credit departments are financing the S-A-S plan. Tickets are not turned over to the customer until the banks have processed and approved the application very much in the same manner as regular consumer credit. Monthly payments can be extended to 24 months if desired. Discount factors on this banking accommodation average less than 6%, varying of course with the maturities. The banks have no recourse to the airline on this paper.

Sabena Belgian Airlines has jumped into the credit competition with its "Easy-Pay" travel plan, which is believed similar to the S-A-S plan.

▶ **American's Arrangement**—On the domestic scene, American Airlines, while participating with the Pan American World Airways credit plan, has its own "Go Now, Pay Later" arrangement. As long as the purchase totals $150 or more, American's plan will finance air trips on its own lines connecting with other air carriers reaching anywhere in the world, package vacation trips, hotel accommodations, rental cars, and other "incidentals." American proposes to finance its paper with consumer credit departments of individual banks in the various cities it serves.

Thus far, less than 10 cities are participating. No down payment is required and installments can range from 12 to 24 months. Interest cost would be about the same as described for the S-A-S plan with no recourse to the carrier on any defaults.

▶ **The Payoff**—So far, Pan American has proved to be the most aggressive in promoting air travel on credit. Up to the middle of last month, the carrier had created some $1.5 million in new business from about 3,200 applicants.

This new business created by the time payment approach has an interesting aspect particularly where a 10% down payment is required, as in the case of Pan American and TWA.

The payment more than covers the 7½% cash commission received by the travel agent. Hence, at the very worst, if the credit traveler defaults, the carrier will be out only the amount of its services.

The chances are that this credit volume will fill up flight seats that might have been empty in any event. Accordingly, the airline can gain much in additional revenues which in the industry's leveraged operations can have a major impact on earnings with only a limited risk.

In other words, once operating costs are covered, virtually all additional revenues received flows through to net. Operating costs are about the same whether 40 or 60 passengers are carried on a flight.

—**Selig Altschul**

NWA Board Promises Nyrop Its Support

- **Former CAB chairman to become Northwest president Oct. 16 with pledge of cooperation from directors.**
- **New chief reports airline is financially sound, has a wisely developed route structure, competent personnel.**

NYROP: "Making good progress."

Donald W. Nyrop, former chairman of Civil Aeronautics Board and onetime Civil Aeronautics Administrator, who has been named president of Northwest Orient Airlines effective Oct. 16, has an official promise of "wholehearted cooperation" from NWA's board of directors.

Nyrop succeeds Harold R. Harris, who resigned last Mar. 4.

The former CAB chairman told a news conference at St. Paul after his appointment that he accepted the job because "I believe in the future of this carrier." He said the company is financially sound, its route structure has been wisely developed, and its personnel is "competent and loyal."

▶ **'No Stranger'**—Appointment of the Washington attorney and long-time aviation leader came as no surprise. It had been predicted freely for several weeks (AVIATION WEEK Aug. 23, p. 12).

Croil Hunter, NWA board chairman and a former president, in announcing the appointment said: "Mr. Nyrop is no stranger to us. We have found him understanding, fair-minded and capable. He has an enthusiasm which should help him face the many problems that arise in commercial aviation. We offer him our cooperation wholeheartedly."

▶ **Equipment Survey**—Nyrop, who admitted Northwest has sold two of its six Super Constellations ordered last year by Harris (AVIATION WEEK June 21, p. 90), said a complete survey of company equipment needs is under way. With a mixed fleet of DC-3s, DC-4s, Stratocruisers and DC-6Bs, addition of Super Connies will increase Northwest maintenance problems, he pointed out.

The newly appointed president said Northwest is "making good progress" in a system of cost control, as well as in increasing traffic volume in face of steadily rising costs.

▶ **Old Problem**—Nyrop said Northwest will announce within 90 days location of its permanent overhaul base, to be moved from Holman Airport, St. Paul. He would not say whether he favored nearby Wold-Chamberlain Airport at Minneapolis or a move to Seattle.

Another problem facing the new airline president is the fight for retention of its Pacific overseas routes (AVIATION WEEK May 31, p. 71).

Malcolm Mackay, who has served as Northwest's chief executive officer since the resignation of Harris, will continue in an active management position, Nyrop said.

Northwest had been looking around since Harris' resignation for a replacement. Harris resigned under pressure after a fight for control of the airline, when a group of directors repudiated his programs and policies (AVIATION WEEK Mar. 29, p. 72). At that time, one industry official commented: "There's nothing basically wrong with NWA that more time and continued intelligence wouldn't have taken care of." Industry observers last week said they believed Nyrop can fill the need.

Nyrop is a 42-year-old Washington lawyer who began government service in 1939 as an attorney in the general counsel's department of the old Civil Aeronautics Authority. During the war he served as a lieutenant colonel with the Air Transport Command.

He was CAA Administrator in 1950 and was named CAB chairman in May 1951, serving there until he resigned Nov. 1952. Since leaving CAB, he has been Washington counsel for local service airlines and was active in their fight for permanent certification.

FTL-Slick Merger Still Muddled

Flying Tiger Line-Slick Airways' joint petition for relief from labor protective provisions imposed on their proposed merger by Civil Aeronautics Board received an unfavorable reception last week from bureau counsel Albert H. Ruppar.

Ruppar was sent by Joseph H. Fitzgerald, director of CAB's Bureau of Air Operations, to Los Angeles to look into the matter at the request of the airlines (AVIATION WEEK Aug. 23, p. 58). He told the Board last week it should deny the airlines' petition because:

- **Conditions imposed** by CAB in the merger were based on the record developed during the hearing in the case. This requires a full hearing before the Board action can be taken, he said.
- **Airlines' request** for a show-cause order by application is one that would "summarily modify the labor protective conditions." Validity of the estimate of costs to be incurred by imposition of the labor protective conditions can be tested only in a full hearing, he said.
- **Burden of establishing** the need for modification of the existing labor protective conditions must be in the public interest. It is not satisfactory simply to make the allegations without establishing proof.

Ruppar said the Tigers-Slick petition might be accepted as an application for modification of the labor provisions and the matter set down for a hearing soon.

The airlines told the Board earlier that they would be in serious financial difficulty if the labor protective provisions were carried out since 900 employes of both FTL and Slick have been laid off since Mar. 26, 1953 (AVIATION WEEK Aug. 30, p. 58). Cause of the dismissals primarily has been loss of business.

When CAB approved the merger of Tigers and Slick early this year, the companies did not anticipate this problem because they expected consolidation to be accomplished much sooner. Neither company sees any solution if they are to merge successfully unless the Board can give some relief at this time.

Cessna Power Sparks Army!

Above, a striking demonstration of take-off performance by one of Cessna's L-19 "Bird Dogs." Even when fully loaded, these powerful Army airplanes are clear and climbing in seconds! They operate in and out of short, unprepared fields, serve 7 basic Army branches, have flown every tough combat assignment from fire direction to wire laying!

And now, in a peacetime role, L-19's broaden their service to the nation. Active Army units use them for observation, administration transportation, courier work, traffic control, even insect spraying. Men of the Army Aviation School and National Guard train in L-19's. During floods, tornados and other civil emergencies, Cessna "Bird Dogs" aid in state relief work. For 4 years, Cessna L-19's have successfully performed every job a versatile U. S. Army could give them! And for 4 years, every L-19 has been delivered to the Army "on schedule"!

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Cessna L-19's require less maintenance than any other airplane used in Army Aviation. They are easily serviced under toughest field conditions, even when punishing 10-below-zero temperatures stop most outside work! Cessna L-19's low maintenance features include: Smooth, service-proved 213 H.P. engine, all-metal construction, world's safest, simplest landing gear.

CESSNA AIRCRAFT COMPANY, WICHITA, KANSAS

NYA Starts First Night Copter Service

New York Airways last week began flying the world's first night helicopter service on scheduled passenger routes, as forecast by AVIATION WEEK (July 19, p. 92).

An NYA Sikorsky S-55 took off from Newark (N. J.) Airport shortly after dusk Aug. 30, landed in complete darkness 34 min. later at New York's La Guardia Field.

► **Expansion**—Robert L. Cummings, Jr., president of the airline, says night service will be extended in late October to New York-Trenton, N. J., passenger flights. At the same time, both day and night flights will be inaugurated to Bridgeport, Conn.

On Sept. 27, NYA will schedule direct 20-min. flights between Newark and La Guardia—the route carrying the bulk of passenger traffic on the airline's three-way, inter-airport shuttle service in the New York area. Idlewild International, formerly the midpoint on all flights, will become the final stop.

► **3,300 Night Hr.**—Cummings says his copter line also plans to increase its flights to 20 daily, providing seats for 100 passengers on operations starting at 7 a.m. and ending just before midnight.

The helicopter airline began operating its night flights under a special waiver issued by Civil Aeronautics Administration after NYA pilots logged more than 3,300 hr. of mail, cargo and test operations after dusk.

They flew over and photographed "every foot" of the route planned for scheduled night passenger flights, drawn up so the S-55s would be within gliding distance of safe landing areas at all times.

On Aug. 17, two copters took off with CAA safety officials aboard. They called for emergency landings without prior warning to the pilots. Seven such tests were made.

► **Built-In Flares**—Copters flying the night route are equipped with two 75,000-candlepower emergency flares built into the S-55s below the tail boom and designed to fly about 40 ft. clear of the aircraft before igniting.

NYA officials say the flares light up an area of approximately 8,500 sq. ft. for a period of eight to 10 seconds. Regular landing lights also will be used for an emergency let down.

Convair Freighter

This new cargo version of Convair's 340, designed primarily for local service airlines, will carry up to 15,000 lb. of airfreight, the San Diego builder reports. Convair says the Freighter's performance will match that of the 340: top speed of 313 mph., range of 2,000 mi., and a 26,700-ft. ceiling. Powered by two Pratt & Whitney aircraft R2800 engines, the cargo transport will be able to take off and climb under a full load on one engine, the company says. Runway requirement for the Freighter is 4,650 ft. The hydraulically operated cargo door is 10 ft. wide, 6 ft. high. The passenger door forward of the wing in the 340 will be kept in the freighter to make it readily convertible to passenger operation. The Freighter's cargo deck will be made of extruded magnesium, fitted with flush tiedowns and stressed for 200 lb. per square foot. It measures 51 ft. 9 in. long and 8 ft. 9 in. wide, will be lined with Fiberglas paneling.

UAL Buys 17 Liners And Airborne Radar

United Air Lines last week had under way a $21-million equipment program combined with a $4-million airborne radar installation on its 179-plane fleet.

The airline is adding 10 58-passenger Douglas DC-6Bs at a cost of $12 million, two 58-passenger Douglas DC-7s at $3.6 million and five cargo DC-6As at $5.5 million.

► **1956 Delivery**—Delivery of the new equipment is expected during the first half of 1956. UAL recently sold its six Boeing Stratocruisers to British Overseas Airways Corp., with delivery scheduled to be made by the first of next year (AVIATION WEEK Aug. 9, p. 53).

Installation of airborne radar in its fleet will make United the first to use C-band radar for weather mapping in flight. The airline conducted four months of tests with an experimental C-band airborne radar unit recently.

► **Radar Next Year**—"With radar equipment on our planes, we will be able to make still further advances in airline schedule reliability and passenger comfort," W. A. Patterson, United president, said. He added that orders will be placed after evaluation tests are completed on C-band production models available from manufacturers. Installation of the equipment is expected to start in the spring of next year.

Pilots using airborne C-band radar will be able to detect corridors for smooth flight through storms, thus avoiding turbulence and eliminating detours.

The radar equipment tested by United was designed specifically for commercial use by Radio Corp. of America. A contract will soon be let to a manufacturer by UAL for its $4-million project.

Capital, BOAC to Gain In Constellation Swap

Capital Airlines and British Overseas Airways Corp. both stand to benefit in the exchange of seven CAP Lockheed Constellation 749As for seven shorter-range BOAC 049 Connies.

Capital expects to make about $2.5 million on the deal, giving it needed capital to help pay for the turboprop

Vickers-Armstrongs Viscounts that will begin arriving from England early next year.

CAP president J. H. (Slim) Carmichael was in England last week arranging the financial details of the transfer.

BOAC needs the aircraft to replace its grounded Comets and has been buying several different types of American transport planes (AVIATION WEEK Aug. 9, p. 53).

The exchange of aircraft is to begin in October and will be completed in June 1955.

American Lays Off 1,300, Cuts Flights

American Airlines laid off 1,300 employes in the wake of its 25-day pilots strike last week. The layoff was the result of AA's $18,750,000 loss during the walkout that ended the week previous (AVIATION WEEK Aug. 30, p. 52). American also curtailed its schedules in order to cut costs.

▶ **Mileage Down**—In a statement announcing the layoff, the airline said it "unfortunately has had to lay off many fine employes during adjustment of operations to the restored pattern of service and the anticipated volume of traffic.

"The post-strike volume of American's scheduled mileage is about 9% under the immediate pre-strike figure. The personnel total is being decreased by the somewhat smaller figure of 7.5%. The actual decrease in employes throughout the system is estimated at about 1,300 out of 17,628."

Prior to the strike, American scheduled about 10 million mi. of flights for the month of October. This now has been trimmed to about 8.8 million mi., AA said.

▶ **Emergency Meeting**—American's action brought immediate response from the CIO Transport Workers Union, whose members include maintenance crews of the airline.

James F. Horst, international vice president of TWU and director of the union's Air Transport Division, said he had been authorized by leaders of other unions to organize an emergency meeting of all unions involved in the layoffs.

The union charged that the layoff will mean "the company will have to put some flights into service without the usual proper maintenance."

▶ **UAL Nonstops**—Meanwhile, United Air Lines scheduled a second nonstop transcontinental DC-7 flight for inauguration Sept. 6 between New York and Los Angeles.

United has scheduled its westbound nonstop flights at 7 hr. 55 min. in order to keep within the 8-hr. flight time limitation rule.

Trans World Airlines has also resumed its nonstop Constellation operation on transcontinental routes. During the strike, TWA canceled the nonstop service in order to put more flights into Chicago.

Comet Crash Test

LONDON—Comet crash investigators at Farnborough have ripped apart the repaired Comet 1 fuselage that gave way under pressurization fatigue tests a few weeks ago.

The rupture occurred in the same place and manner as in previous tests—along the top of square windows in the passenger compartment.

This confirms that modification of the Comet 2 will be necessary, since it has the same construction. Preliminary information is that the strengthening cost will not be prohibitive either in dollars or sacrificed performance.

The Comet 3 has round windows and thus may not require as extensive changes as the Series 1 and 2, if it requires any.

Pressurization fatigue obviously must be countered, but there still may be other causes for the two Rome crashes when final announcement is made.

Long to Push Rate Cut For Airline Baggage

Legislation requiring airlines to ship excess personal baggage up to 150 lb. at freight rates will be pushed at the next session of Congress by Sen. Russell Long.

He estimates this would cut the cost to passengers for additional baggage, over and above the free allowance, by one-third. Long argues that less handling efforts are involved by airlines in shipping excess personal baggage, brought to the airport and picked up at the point of destination by the passenger, than in shipping airfreight.

"The scheduled airlines have contended that they have excessive freight capacity far beyond their requirements and that additional service by all-freight lines is unneeded," Long says.

West Germany Forms New Nonsked Airline

(McGraw-Hill World News)

Bonn—A new German charter airline, Deutsche Lufttransport GmbH, has been formed at Hamburg and will operate under British colors until West Germany regains its "air sovereignty." It is capitalized at $119,000.

DLT will use three Douglas DC-3s owned by Lancashire Aircraft Corp., London, one of the co-owners. Germans hold most of the airline's capital.

The new line and Lufthansa are expected to sign an operating and "common interests" agreement soon.

IATA Transactions Reach New Peak

International Air Transport Assn.'s clearing house at London handled a record $26,243,000 in airline traffic transactions during June, IATA reports.

This represents a 26.2% increase over the turnover for the same month of 1953. The previous monthly high, registered in September of last year, was $23,884,000.

The June turnover helped swell the total amount handled by IATA during the first half of the year to $127,856,000, an increase of 17.3% over the total for the same period of 1953.

Sabena S-55s Finish First Year

Sabena Belgian Airlines' fleet of four S-55 helicopters carried nearly 18,000 passengers during the first year of operations that ended last week. The airline says 15% of the S-55 passengers never had flown before, concluding that an "entirely new clientele has been developed by the helicopter for international air transport."

CAB ORDERS

(Aug. 20-25)

DISMISSED:

Long Island Airlines' application for a certificate of public convenience and necessity.

APPROVED:

Intercompany agreements between Northwest Orient Airlines and Western Air Lines and various other air carriers.

DENIED:

Joint petition of city of Las Cruces, N. M., and Mesilla Valley chamber of commerce requesting service by Continental Air Lines.

Eastern Air Lines' second petition for reconsideration of an agreement among EAL, Braniff Airways and Trans World Airlines for through service by equipment interchange at California, Texas and Florida points, as well as Eastern's application for a route extension across the Gulf of Mexico from Tampa, to Houston, Tex.

Los Angeles chamber of commerce petition for leave to intervene in the additional Southwest-Northeast service case.

Consolidated Flower Shipments' request for an exemption from compliance with the Civil Aeronautics Act and Part 296 of the CAB's economic regulations or an exemption permitting it to continue substantially its present operation and practices without filing the tariffs required of all air carriers by Section 403 of the Act for evidence of insurance required of domestic airfreight forwarders.

ORDERED:

Investigation of Trans-Caribbean Airways' reduced passenger-mile rates filed for air transportation of passengers in the U. S. and to points in Alaska, Hawaii and Puerto Rico. CAB suspended Trans-Carribean's rates until the investigation is completed.

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CAB Reports Causes Of Two Air Crashes

Civil Aeronautics Board investigations of two twin-engine transport crashes found that adverse weather caused one while faulty maintenance was to blame for the other.

The crashes and CAB's findings:

• **Western Air Lines** Convair 240 near Wright, Wyo., Feb. 26, killing nine persons. Considerable icing and turbulence caused a sudden loss of control, Board investigators find. They say the 240 lost 12,000 ft. in approximately five minutes immediately before the crash.

• **Resort Airlines** C-46 during a landing at Standiford Airport, Louisville, Ky., Sept. 28, 1953. Twenty-five persons were killed. CAB says the pilot lost control when the left elevator failed as the C-46 ballooned slightly on its first approach and started to go around for a second try. The transport stalled out and crashed.

The elevator failed because of "improper maintenance and use of parts that did not meet specifications," the Board says. Non-approved bearings and bolts were used in the elevator.

Commercial Pilots To Take a New Exam

Commercial pilots throughout the country will begin taking a new type of "scenario" written examination in September, according to A. S. Koch, Civil Aeronautics Administration Aviation Safety Director.

The new examination requires the pilot to answer questions based on "acting out" an actual cross-country flight, including stops at three or more airports. To answer the 80 questions in the exam, the pilot must carry out preflight preparation just as if he were about to make the actual flight, then "navigate" the route, using existing radio ranges and other aids.

"Commercial pilots, who carry passengers for hire, must have a practical, working knowledge of cross-country flying," says Koch. "The new examination stresses use of the excellent facilities available to the pilot of today, including electronic airway aids, U. S. Weather Bureau facilities, and CAA communication stations and traffic control towers."

Turboprop F.27

- **Fairchild renews rights to new Fokker airliner.**
- **First DC-3 replacement scheduled to fly in May.**

Fairchild Airplane & Engine Corp., Hagerstown, Md., has renewed its license agreement with Fokker Royal Netherlands Aircraft Factories and within a year will be ready to consider production orders for the twin-turboprop Fokker F.27 Friendship transport.

Richard S. Boutelle, Fairchild president, says he expects American interest in the 28-to-36-seat Dutch airliner, designed as a replacement for the Douglas DC-3, will be stimulated by these developments:

• **Capital Airlines** decision to replace its equipment with Britain's turboprop Vickers Viscount (AVIATION WEEK Aug. 23, p. 55). The Friendship will be powered by the Rolls-Royce Dart turboprop engine, identical with the Viscount's powerplants, and will have the same propellers. This coincidence will ease the maintenance problem for operators of the Dutch-designed transport.

• **Westinghouse Electric Corp.**, already affiliated with Rolls-Royce in a technical agreement, has expressed interest in building the Dart engine in this country—particularly if Convair decides to use it in a turboprop version of the 340 transport (AVIATION WEEK Aug. 23, p. 17).

• **Fokker** is progressing on schedule with construction of the F.27 prototype, slated to make its first flight next May.

• **A market survey** conducted for Fairchild by Ray & Ray, Washington aviation consultants, indicates there are at least five local service airlines to whom the Friendship would be an attractive piece of equipment and financially feasible at the present quoted price of $400,000 to $500,000.

• **Fairchild** expects interest from trunk airlines that serve a substantial amount of short-haul traffic and from corporate aircraft owners who need a plane of the F.27 category.

Fairchild must have orders totaling at least 200 aircraft in order to meet the $400,000 price originally quoted by Fokker for the F.27s.

Jan Gerritsen, sales manager for the Dutch company, and F. L. Diepen, director, said before they returned to Holland that Fairchild has a license to build and sell the F.27 in the entire Western Hemisphere—with the exception of Brazil, where Fokker has a subsidiary.

▶ **Lower Costs**—The F.27 is described as a shorthaul transport, most efficient on 75-to-300-mi. hops but entirely practical for runs up to 1,000 mi. It will be able to take off from a 2,400-ft. runway.

Operating costs per seat-mile and per ton-mile will be lower than those of the Douglas DC-3 but operating costs per plane-mile will be higher on the F.27.

Both Fairchild and Fokker expect turbine engine improvements in the next two to three years that will result in even better performance figures for the F.27.

The Friendship will be 73 ft. long, 26 ft. 6 in. high and have a wing span of 95 ft. Normal takeoff weight will be 32,630 lb., maximum gross 34,200 lb. Normally, fuel plus payload will vary from 10,945 lb. for the 36-seat version to 11,305 lb. for the 28-seat.

At normal takeoff weight for a 300-mi. flight, payload for the 28-passenger version will be 7,917 lb.

The aircraft's highwing configuration will facilitate loading. The front cargo door will be 3 ft 3 in. above the runway when the plane is parked. The rear, passenger door will be 4 ft. above the runway.

Lee Reports Increase In Airways Navaids

Navigation facilities along the nation's airways were increased substantially during fiscal 1954, F. B. Lee, Civil Aeronautics Administrator, reports.

An inventory of federal airways facilities operated by CAA revealed that VOR direct airways, those using very-high-frequency omni-directional radio ranges, increased 9,516 mi. during the year ended June 20, while VOR alternate airways increased by 1,537 mi., Lee says.

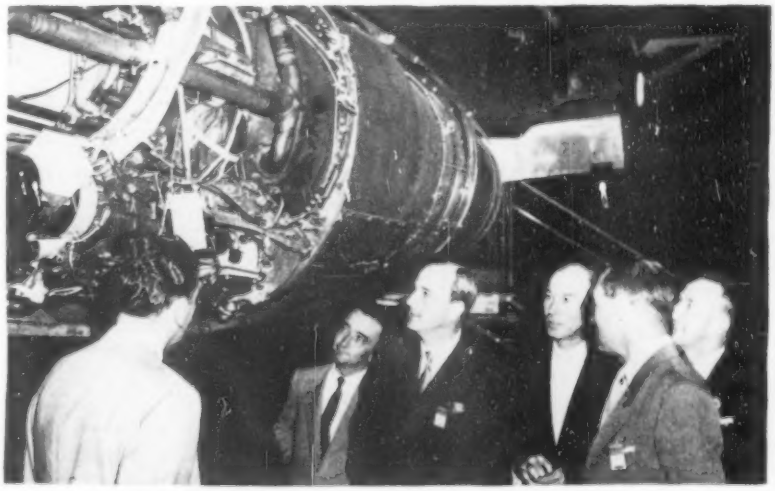
▶ **New Systems**—Alternate airways are those that fan out of and into busy air terminals, making it possible to move traffic faster by using horizontal as well as vertical separation.

A total of 16 surveillance radar installations and 24 instrument landing systems were put in use at high-density traffic airports during the year. Five VHF omniranges were commissioned, accounting to a large degree for the increase in the VOR direct airways mileage.

Greatest increase in airways aids was in the installation of DME (distance measuring equipment) at 151 locations, bringing the total to 167, as against 11 the previous year. Manufacturers of DME have kept pace with the installation of ground equipment and have sold a considerable number of airborne sets, Lee says.

▶ **Efficiency Program**—While the number of communications stations decreased during the year from 411 to 384, there was an increase of 20 combined communications stations and control towers, in a planned program for more efficient operations by consolidations where possible.

Decreases in such older-type facilities as intermediate fields, airways beacons and low-medium frequency radio ranges, made possible by technical improvements, were according to schedule, Lee reports.



KLM Officials Inspect Boeing 707

A group of KLM Royal Dutch Airlines officials, headed by company president Gen. I. A. Aler (second from right), recently inspected the Boeing 707 jet Stratoliner at Seattle. The airline officials here are shown as they inspected one of the jet transport's four Pratt & Whitney Aircraft JT3 engines (commercial version of J57).

SHORTLINES

► **Avianca** has taken delivery on the first of three Lockheed Super Constellations, plans to put it on New York-Jamaica-Colombia run Oct. 1. The two other Super Connies are scheduled for delivery Sept. 7 and 14.

► **Avensa,** Venezuelan associate of Pan American World Airways, has asked Civil Aeronautics Board for permission to inaugurate two routes to the U. S.: Maracaibo-Curacao-Jamaica-Miami and Maiquetia-Maracaibo-Jamaica-New Orleans.

► **Civil Aeronautics Administration** has approved transfer of an interstate airways communications station from San Francisco Municipal Airport and its consolidation with the facility at Metropolitan Oakland International Airport.

► **Emery Air Freight Corp.** has opened an office at Louisville, Ky.

► **Hunting-Clan Air Transport,** British independent airline, plans to introduce a "go and pay" installment plan for air travel some time early next year.

► **International Civil Aviation Organization** reports Ecuador has joined the association, becoming ICAO's 64th member nation.

► **Japan Air Lines** has signed a sea-air interchange agreement with American President Lines.

► **Lake Central Airlines** will begin carrying regular first-class mail by air Sept. 8 from Indianapolis, Kokomo and South Bend, Ind., and Kalamazoo, Mich.

► **North Central Airlines** is increasing the seating capacity of its 18 DC-3s from 21 to 25.

► **Pan American World Airways** reports air cargo shipments between Puerto Rico and Miami increased 33% during the first 30 days after bulk rates were reduced July 24.

► **Sabena Belgian Airlines** has inaugurated a new weekly DC-6A aircoach flight linking Brussels with Leopoldville and Johannesburg, South Africa.

► **Trans World Airlines** has released a new film, "Air Adventure to Europe," for showing before U. S. college and university groups which plan to conduct student and teacher tours next summer.

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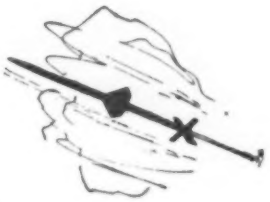

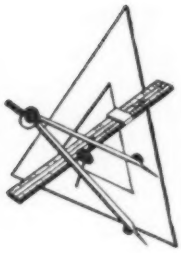

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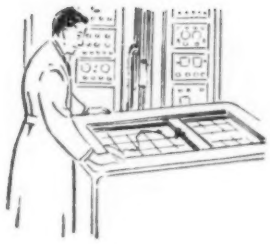

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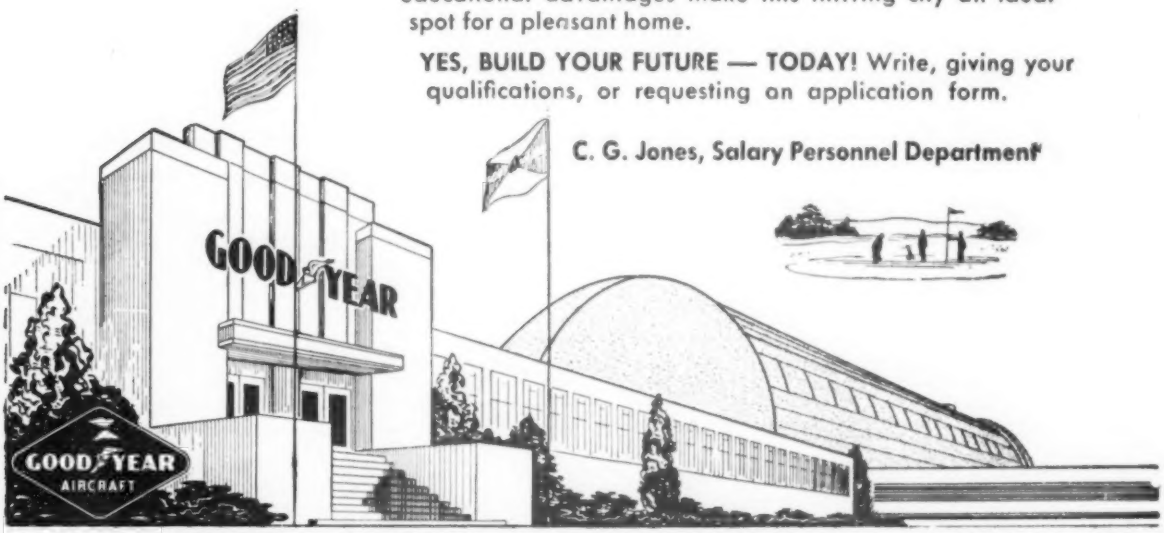

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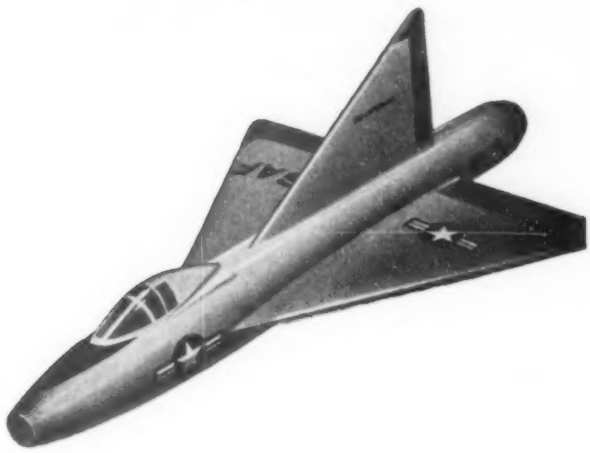

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SEATTLE

I drove an airplane through the streets of downtown Seattle last week.

This, I must confess, was a somewhat unique experience for one who is accustomed to having his airplanes come complete with airports and runways, remaining in that prosaic vicinity until airborne.

The airplane was the Aerocar and the man at my side was a man with a dream, Moulton Taylor, president of Aerocar, Inc., of Longview, Wash.

▶ **Beetle-Like**—The Aerocar, if you're not familiar with it, is the unusual half-airplane half-automobile that keeps turning up at all aeronautical gatherings in the Pacific Northwest. Its wings and tail can be unhitched from the fuselage after landing, neat as you please. They then can be folded up on their own wheels and towed like a small trailer.

What is left after the flying apparatus is removed is a somewhat strange-looking automobile, slightly resembling a two-place sportscar. The beetle-like hardtop body is fibre glass and very neatly turned out. The seats are comfortably upholstered, and the interior has a conventional automobile look. This even includes a cigarette lighter.

The gearshift, as in many imported sports cars, is on the floor. This keeps it off the steering column, which handles like any lightplane control column when it is unlocked from the highway driving position.

You can find the usual automobile instruments on the dashboard along with an altimeter, airspeed indicator, cylinder head temperature gauge and turn-and-bank indicator.

▶ **For the Masses?**—Moulton Taylor is a man who can talk for hours about the Aerocar if he gets you cornered. He got me cornered. Taylor believes his strange craft is the only answer to mass transportation in the air.

"What else," he demands, "can you drive out of your garage to the airport, unfold the wings and fly to your destination, then unhitch the wings and drive to your hotel?"

He had me. I couldn't think of a thing.

Those accustomed to seeing Taylor's prototype Aerocar turn up at aviation gatherings were somewhat surprised at the Institute of the Aeronautical Sciences turbine meeting here to find two shiny new Aerocars parked in front of the Hotel Benjamin Franklin.

▶ **No Soap**—Taylor says he has the two production models and the prototype now flying, with two more cars 80% complete. If you want one, he is accepting orders at $25,000 each.

"It would be worth $25,000 in advertising to any soap company just to arrive in a town with their name painted on the side of one of these," he says hopefully. But thus far, no soap.

As for certification by Civil Aeronautics Administration, Taylor says all structural, dynamic and static tests have been completed satisfactorily. Part of the flight tests have been completed. He is not planning any publicity campaign until he gets certification.

It takes five minutes to put the wings on or take them off. The modifications for the automobile operation cut 15 hp. off the Lycoming engine, reducing its output to 135 hp. Top speed is 100 mph.

▶ **Downtown Test Hop**—A number of idlers turned up on the sidewalk to peer in the windows of the Aerocar the afternoon I was preparing for my first test hop through the downtown streets. These included CAA's Fred Lee, Lockheed Aircraft Corp.'s Hall Hibbard and an airline pilot.

The Lycoming roared into action with the death rattle of a Model T Ford. We putt-putted off up the street with Taylor at the wheel, leaving the wings behind at the hotel to make maneuvering easier.

After two blocks, Taylor nodded to the dual controls. "You take it," he said. I grabbed the wheel and, whistling "The High and the Mighty" through grimly clenched teeth, began weaving through Seattle traffic. After breaking hard left to lose an overtaking Cadillac, I turned it back to Taylor.

I didn't get a chance to fly this remarkable invention. But the next afternoon while puttering around the Boeing-Seattle plant, I heard a loud putt-putting and a strange four-wheeled aircraft flew overhead.

Moulton Taylor was on his way home to Longview in the Aerocar.

—**William J. Coughlin**

AVIATION CALENDAR

Sept. 11-12—Aircraft Owners & Pilots Assn., seventh annual summer roundup flight, Nantucket Island, Mass.

Sept. 13-17—International Air Transport Assn., 10th annual general meeting, Hotel de la Rochefoucauld, Paris.

Sept. 13-24—Instrument Society of America, first International Instrument Congress and Exposition and third annual Analytical Instrument Clinic, Philadelphia.

Sept. 19-21—International Northwest Aviation Council, 18th annual convention, Hotel Vancouver, Vancouver, B. C.

Sept. 21-23—Society for Experimental Stress Analysis, annual meeting and exhibition, Bellevue-Stratford Hotel, Philadelphia.

Sept. 22-24—American Rocket Society, fall meeting, Hilton Hotel, El Paso, Tex.

Sept. 22—Southwest Airmotive-Pratt & Whitney Aircraft, engine maintenance and operation forum, Love Field, Dallas.

Sept. 30-Oct. 1—Radio Technical Commission for Aeronautics, fall assembly, Washington, D. C.

Oct. 1-2—Airmail Pioneers, division reunion, Lexington Hotel, New York.

Oct. 4-6—Tenth annual National Electronics Conference, Hotel Sherman, Chicago.

Oct. 5-7—Champion Spark Plug Co., 10th annual Aircraft Spark Plug and Ignition Conference, Secor Hotel, Toledo, Ohio.

Oct. 5-9—Society of Automotive Engineers, National Aeronautics Meeting, Aircraft Production Forum and Aircraft Engineering Display, Hotel Statler, Los Angeles.

Oct. 11-12—Aircraft Industries Assn., symposium on titanium parts, Cleveland.

Oct. 13-14—American Assn. of Airport Executives, 1954 conference on airport management and operation, University of Oklahoma, Norman, Okla.

Oct. 14-15—Institute of the Aeronautical Sciences and Canadian Aeronautical Institute, joint meeting, Montreal.

Oct. 17-22—International Union of Aviation Insurers, annual general meeting, New York.

Oct. 18-19—American Society of Mechanical Engineers and American Society of Lubrication Engineers, lubrication conference, Lord Baltimore Hotel, Baltimore.

Oct. 18-22—National Safety Council, Aeronautical Section, Conrad Hilton Hotel, Chicago.

Oct. 21-23—American Society for Quality Control, eighth New England conference, Ten Eyck Hotel, Albany, N. Y.

Oct. 23—Airmail Pioneers, division reunion, VFW Club, Elmhurst, Ill.

Nov. 8-9—National Aviation Trades Assn., annual convention and meeting, Biltmore Terrace Hotel, Miami Beach, Fla.

Nov. 8-10—Air Industries & Transport Assn. of Canada, annual meeting, Chateau Frontenac, Quebec City.

Nov. 9-12—Air Line Pilots Assn., convention, Sheraton Hotel, Chicago.

Nov. 10-12—Industrial Management Society, 18th annual time and motion study, Hotel Sherman, Chicago.

Nov. 11-12—Airmail Pioneers, division reunion, Hollywood Roosevelt Hotel, Los Angeles.

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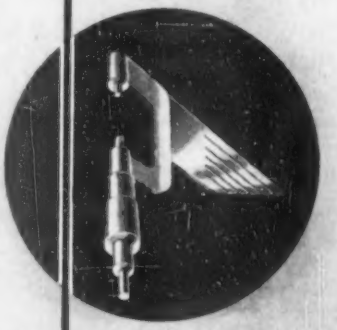

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The program of the Air Force's world-wide campaign to achieve maximum effectiveness and efficiency of its resources—money, manpower, facilities and materiel—has never been presented in the press. AVIATION WEEK *has appropriated extra space for a series on the new U. S. Air Force, outlining this program, and some of its achievements to date. The series started last week with the first installment of a report to Congress last May by H. Lee White, then Assistant Secretary of the Air Force for Management. The second installment of his official report follows.*—**RHW**

Management and Operation II

By H. Lee White

FOREIGN NATIONALS REPLACE U. S. MEN

6. **It appeared to us** that certain benefits would be derived if we could utilize foreign nationals to perform work they were capable of performing if such hiring resulted in the replacement of military personnel, who could be assigned to combat functions of the Air Force. This project has come to be known as "Native Son." The benefits derived from this plan are as follows:

(A) We would replace a military man by an indigenous civilian whose rate of pay by the foreign country was comparatively lower. For example, we would have to pay a Japanese only $800 a year, a Frenchman on the average of about $2,100 a year, a German at no dollar cost during fiscal 1954, since we would pay for him out of Deutschemarks credits received from the Federal Republic of Germany. This made an airman available for a new combat unit.

(B) We would save military personnel in support-type activities for both the replaced airmen as well as their dependents.

(C) We could save the money involved in travel of the military personnel and their dependents.

(D) We would reduce the pipeline for both training and travel.

(E) We would reduce the requirements for housing and supplies necessary to feed and equip the men replaced.

(F) Relationships with the foreign countries involved would appear to be better under such a program. As a matter of interest, I would like to quote a statement made by a French official after Project "Native Son" started on this point. Robert Martinod, Secretary General of the Prefect of Indre, explained for the French:

"Today there is no great problem. The Americans are here. And it is for the best. When they arrived 2½ years ago there were certain sections of the population which were influenced by the Communists. Lately, however, and I can say as a direct result of 'Native Son,' the influence of the Communists has lessened. It has lost its bite. What can the Communists say about a situation which is providing 2,000 new jobs for French workers?"

Under Project "Native Son" and the early-release program, there were two extremely difficult problems that faced us; namely, where were we going to get the money to pay the civilians, and the money to cover the additional travel costs? The 1954 travel costs would be greater than estimated since more travel would come into 1954 than was originally estimated, although in 1955 and subsequent years, it would be less than originally programmed at the time the fiscal 1954 budget was prepared.

Travel funds did not present too much of a problem since they are provided for under the military personnel appropriation and, therefore, a savings generated in this appropriation by the actions taken could be used in part to pay the additional travel costs caused by the actions in fiscal 1954. On the other hand, though it meant a substantial savings to the Air Force, savings in the military personnel appropriation could not be used to pay for the additional civilians since they were in another appropriation.

We were fortunate, however, because progressing concurrently were other studies and programs leading toward saving civilian manpower and, as a result of one of these studies, it became evident that the Air Materiel Command could be reduced by 14,000 civilian personnel. The 14,000 reduction was put into effect through attrition and the $32 million derived therefrom, together with certain other personnel savings resulting from similar-type reductions, were placed in a reserve account to be drawn upon primarily for Project "Native Son." The total funds put into the reserve amounted to $34 million, of which we have since allocated approximately $5 million to finance Project "Native Son" for the balance of fiscal 1954.

On the basis of the actions taken this year in Project "Native Son," we have already authorized the commands to hire 11,150 foreign nationals (to be paid for by the $5 million referred to above). We have also authorized the employment of approximately 9,700 additional German nationals to be paid from Deutschemark credits received from the Federal Republic of Germany.

It can, therefore, be seen that we have already authorized the hire of 20,850 nationals at a cost of $5 million to the United States government, or less than ¼th of the amount that was saved from the reduction at the Air Materiel Command. As the result of these actions, we are withdrawing 30,000 military personnel from support-type functions. On the basis of studies already made this year, it appears that during the balance of this year and fiscal 1955, the total will reach 31,000 foreign nationals, and we will relieve thereby 43,000 military personnel.

Of course, we expect that by the end of fiscal 1955 we will even exceed these figures, but we could not budget for anything which had not progressed far enough to be firm.

It is, of course, true that during fiscal 1955 and subsequent years the cost for foreign civilians will, therefore, be higher than under any previous program of the Air Force, but I assure you that the joint cost of military and civilian personnel will be less than that which was programmed before Project "Native Son" started.

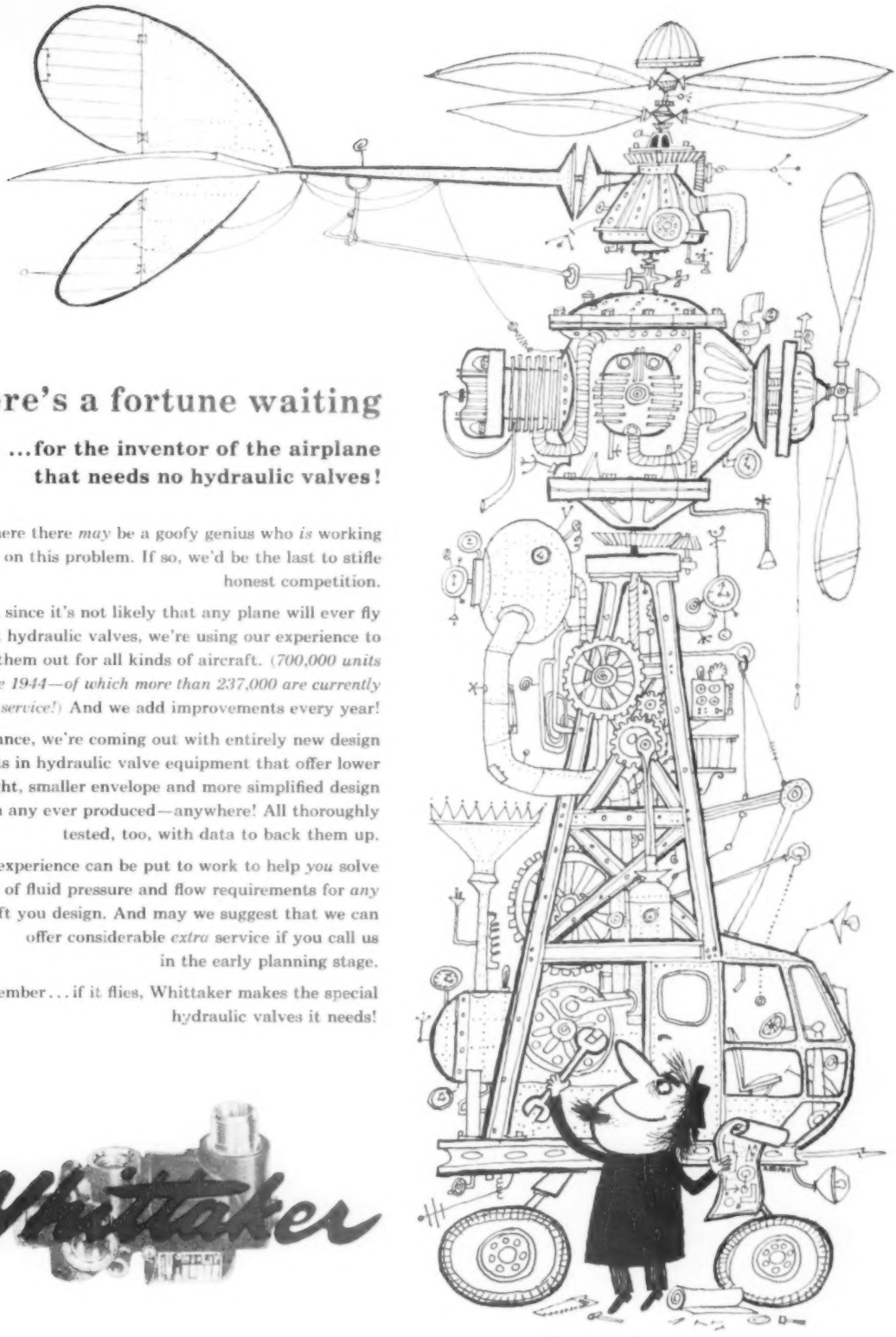
GEARING TRAINING TO EXPIRATIONS

7. **The technical training** load has been stabilized so that we do not have a violent swing between fiscal years with all the consequent costs in manpower and money. We have geared training so as to train for the hard core skills which will be short as a result of expiration of enlistments from now through fiscal 1955.

WORK MEASUREMENT STUDY

8. **Another important example** of our efforts to attain a more efficient operation is the introduction and development of work measurement in our extensive depot maintenance activities. We started this project in April 1953 at the Air Materiel Area at Sacramento. As a result of the work done so far at Sacramento not only has our production effectiveness there increased significantly, but further, it is estimated that this initial achievement will result in an approximate $2.8-million annual saving at this one depot.

(To Be Continued)



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